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ABSTRACT

This study offers a conceptual framework for preparing people for adequate performance of occupational roles, an analysis of key issues, and information on experiences and current practices in the field. The main features of the conceptual framework include general education, general plus pre-occupational education, job-entry training plus further education, and career-long further training and retraining plus further education. The logical starting point for planning a developing country's occupational education and training system is analysis of its emerging needs for qualified personnel. An integrated planning approach begins by surveying the country's activities that will require qualified personnel and proceeds to the needs of each sector and ultimately to each employing establishment. Once the planner has a fairly clear idea of the kinds of qualifications needed, the curriculum content must be determined. Next, the planner must consider the institutions available and ways to link the formal education system and the employment system. Finally, the over-all planning, coordinating and financing of the training system must be considered. (SB)

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PLANNING OCCUPATIONAL EDUCATION AND TRAINING FOR DEVELOPMENT

by Eugene Staley

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FOREWORD

by

Paul R. Hanna

This publication is the first in a research series being produced in the Stanford International Development Education Center with the purpose of throwing light on a set of problems that is central to education's role in modernization and development. What educational *content* is most relevant to, and most likely to assist in obtaining, desired types of economic-social-political development -- especially in, but not limited to, the newly developing nations? The focus of the series, in other words, is on the *curriculum* problem viewed from the standpoint of the requirements of development in a national community or other larger or smaller scale communities of men.

Educational content as we view it in this research enterprise includes *methods* of instruction insofar as differences in method influence the content of the educational message that gets across and subsequently affects the attitudes and behavior of the community. Thus, we are naming this series "SIDEC Studies on Content and Methods of Education for Development."

The research program and the resulting publications will at the outset emphasize three aspects or subtopics. Perhaps others will be added later. The three aspects on which studies are now completed, in progress, or being planned are:

Occupational Education and Training
Education and the Formation of Social and Civic Attitudes
Education and the Rural-Urban Transformation

The present work by Professor Eugene Staley introduces the first group of studies on the subtopic of Occupational Education and Training and its role in the development process. Professor Staley provides a broad conceptual framework which, it is hoped, will illuminate the issues in this important aspect of educational development problems and assist in achieving sharper focus for further theoretical and empirical investigations in this field. We are issuing simultaneously other reports, monographs, and papers in the subseries on Occupational Education and training, prepared under Professor Staley's supervision. (See the publications list on page

Studies in the other two aspects or subtopics are in preparation, and publication of some of them will begin in the near future.

On behalf of all of us associated with SIDEC, may I express our appreciation to the many individuals, groups, foundations, governments, and other entities that have contributed to our research effort. In the beginning of SIDEC's program, Stanford University and its School of Education contributed staff, space, and encouragement. The Ford Foundation was generous in funding an expansion of staff and program. During the past six years, the U.S. Office of Education, Bureau of Research, has made possible a much greater focus on research for which we here acknowledge our thanks. The ongoing research that will result in further publications in this series will be the direct outcome of the funding from the USOE.

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CHAPTER 1

A CONCEPTUAL FRAMEWORK

All around the world, development planners and their specialists concerned with education and human resources development are grappling with urgent problems on how best to prepare persons for occupational roles in a changing economic-social-political system. For example:

In India, a high-level Education Commission of 1964-66 strongly urged "vocationalization" of education, especially at the secondary level. Authorities are seeking ways to implement this recommendation. Most of them agree that secondary education is at present too exclusively academic. It aims for university entrance, but only a minority of the students can, in fact, move into the limited number of places available even in the greatly expanded university system. The majority who terminate at or before the end of secondary school need some sort of preparation for entering the world of work. These issues are made more delicate and urgent by India's long-standing and increasing problem of "educated unemployed."

The United Kingdom, first-comer to the industrial revolution, embarked upon a revolutionary new approach to its occupational training problem with the adoption of the Industrial Training Act of 1964. A system of Industrial Training Boards was established, each board financed by a levy on payrolls in its industry. The Boards are authorized to make grants (rebates of the levy) to support training programs of employing establishments and to subsidize associated further education; they also carry on programs to improve instructional methods and materials.

In Nigeria, a working seminar of leaders in vocational-technical education, after visiting several countries to observe and analyze a variety of policies and methods, produced a plan of action in 1966 calling for many reforms and innovations. The report stressed the importance of general education and of pre-vocational foundation subjects in preparation for more specific training of craftsmen and technicians. It went into detail on craftsmen training and vocational schools, technician training and technical colleges, systematic development aid to the small entrepreneur and his apprentices, and the need for industry to assume more responsibility for training.

In the United States, the Office of Education of the U.S. government, the Ford Foundation, and other agencies are encouraging research and pilot operations for the development of new concepts, curricula, and methods designed to achieve better integration of "academic" and "vocational" elements in education. Many programs and experiments are being mounted by federal, state, and local organizations to make better opportunities available for acquisition of employable skills by minority groups and people in underprivileged enclaves of the economy. Business corporations, especially in lines like electronics and computer technology where there is a dizzying pace of technological change, are giving hitherto unheard-of emphasis to training programs for their own employees and those of their customers, and some of these programs are highly innovative.

In Latin America, a special style of organization, represented by SENAI in Brazil, SENA in Colombia, INCE in Venezuela, and INACAP in Chile, has been adopted in many countries, mainly in the last decade. Designed to promote more and better occupational training, most (not all) of these organizations are governed by boards representing employers, workers, and government ministries of education and labor. They are mostly financed by payroll levies. Their development has been assisted by the International Labor Organization and its Latin American affiliate, CINTERFOR. These organizations administer apprenticeship programs, run training establishments of their own, promote and assist training programs within employing establishments, train instructors, prepare training materials, and undertake research designed to make occupational training more effective.

The common element in all five of the examples cited above is deep concern with certain perplexing problems that face any society in preparing its members for adequate performance of occupational roles in modern or modernizing economic, social, and political systems. These problems have fundamental similarities (along with important differences) in countries at diverse levels of development and with dissimilar economic-social-political systems and ideologies.

Among the problems are these:

1. The over-all concept or "philosophy" of occupational preparation appropriate to modern or modernizing societies

What types of learning have to take place to prepare people adequately for modern occupations? What are the functional roles in this learning process of general education, occupationally oriented education, specific training, and work experience? When should the individual begin his occupational preparation? In what sequence should it proceed? Should it terminate when the individual becomes adult, or continue throughout the working career?

2. Ascertaining the kinds and quantities of qualified personnel needed by the employment system

What combinations of knowledge, skills, and personality traits are adequate, or optimum, for occupational roles of continuing or emerging importance? How can one throw light on this basic question? How can present and future needs be estimated, quantitatively and qualitatively?

3. Designing education and training programs and curricular content

To what extent and by what methods should the needs of the employment system be taken into account in constructing educational programs? How can specific training be better matched to the existing and emerging needs of the employment market? What are the implications for education and training of the need for versatility in adjusting to technological changes? Should the distinction between general and vocational education be maintained, or should both be reorganized so that each becomes an integral part of the common core of all education?

4. Determining institutional responsibilities for occupational education and training

What should be the respective roles of the formal school system and of employing organizations? Of other institutions and agencies? To what extent should specific training be provided before employment? In employment? What institutional arrangements, if any, should be made for updating knowledge and skills during employment? Within the school system itself, should there be comprehensive schools or separate academic and vocational schools or some combination of both systems?

5. Handling organizational, administrative, and financial requirements

What organizational mechanisms are required to establish an effective linkage between the school system on the one hand and the employment system on the other? How should the costs of occupational education and training be covered? To what extent is it desirable and feasible to have specific training costs borne by the employment system? What devices can be used for this purpose? What incentives can be devised to encourage extension and improvement of training within the employment system?

This study aims to provide some helpful concepts, information, and ideas to persons who have to grapple with puzzling issues like these. Among such persons are decision makers or advisers concerned in the design, redesign, or improvement of education and training systems, students concerned with understanding education's role in economic-social-political development, and researchers seeking to locate problem areas where they may help advance the frontiers of knowledge or improve social technology in a field that urgently needs such efforts.

The study does not pretend to come up with universal solutions for the issues that it discusses. What will work best in one environment at a particular state of development may not fit the circumstances of a different environment at another place or time. Furthermore, not enough is known about the complex factors (economic, psychological, social, political) interacting in this field to enable one to make definite statements on some of the most crucial points. While this study will not refrain from reaching conclusions and putting forward positive suggestions on the basis of the best analysis and evidence available to the author, every conclusion should be regarded as a hypothesis, subject to further testing and rethinking, and every suggestion as tentative, for thoughtful reconsideration in each specific environment where it might be applied.

What the study can and does offer is essentially three things: First, a method of thinking about the problems involved in preparing people for adequate performance of occupational roles in a modern or modernizing society -- a conceptual framework or "model"; second, an analysis that brings key issues to the fore; and third, information that will help the reader to enlarge his acquaintance with suggestive experiences and current "best practices" in the field.

OET and Developmental Goals

Occupational education and training -- OET for short -- means in this study all activities in schools or in employment or elsewhere which are either deliberately designed to prepare persons to perform well in occupational roles or do in fact do so. These occupational roles can be in industry, agriculture, commerce, government and politics, health services, education and research, journalism and other social communication activities, or household activities, including those of women occupied in homemaking.

The title -- "Planned Occupational Education and Training for Development" -- signifies that the focus will be on occupational preparation as related to the attainment of economic, political, and social goals. Attention is deliberately not confined to the economic. This is one of the ways in which the present approach departs somewhat, at least in emphasis, from that of a number of other discussions of occupational manpower problems.

The author is an economist by background, but as a development economist he has learned that development does not take place in compartments. The economic, political, and social aspects of things do not exist separately in the real world; they are mental structures in our heads, very convenient for facilitating division of labor and getting ahead with certain kinds of analysis, but also dangerous because capable of disguising important interrelations that may be of the essence of certain kinds of problems. The planning of education and training with a view to preparing people to perform well in modern-type jobs, thereby facilitating progress toward developmental goals, is such a problem.

The allusion here to "developmental goals" means objectives set by a society for itself though a variety of decision-making mechanisms, sometimes implicitly, sometimes explicitly, as in a development plan. The goals of today's newly developing countries differ, of course, from country to country and also from time to time. But there are some common characteristics and some widely shared goals.

In their economic aspects, developmental goals generally call for increasing total and per capita output and income through adoption of more modern methods of production. Often there is emphasis on more equitable distribution of the product and on providing more employment opportunities.

Goals of political development may include such things as solid establishment of independence, more effective and responsible participation by wider segments of the population in political processes, increased governmental capability to cope with all kinds of problems as they arise, effective direction and administration of the country's developmental efforts, and -- though interpreted differently in different countries -- enhancement of human dignity and personal freedoms.

Among widely shared developmental goals usually referred to as social are such things as improvement in health, more and better educational opportunities, improvements in family life and in the well-being and upbringing of children, reduction of birth rates to correspond with reduced death rates, thus controlling the population explosion, and lessening of social delinquencies, intergroup tensions, and frustrations among young people and adults.

For the attainment of these developmental goals, each developing country must somehow manage to generate substantial numbers of specially qualified personnel -- planners, administrators, entrepreneurs, political leaders, mechanics, technicians, teachers, engineers, agricultural advisors, modern-minded farmers, physicians and related health workers, and many other types.

Education and Preparation for Jobs

The purposes of education are multiple. Only one of them is to prepare people for occupational roles. The fact that this essay deals mainly with that purpose by no means implies that other purposes are unimportant. On the contrary, it is desirable to be quite clear that education should seek to promote many aspects of personal self-fulfillment and a wide variety of social objectives, not merely preparation for jobs.

In truth, an education directed too narrowly toward occupational ends might not even be good occupational education. Conversely, good occupational education will also assist in the attainment of the broader personal and social goals of education.

The time-honored and most universal aim of education is what the anthropologists have taught us to call enculturation: fitting people to take part and to contribute satisfactorily in all kinds of interpersonal and institutional relationships required by their culture. Obviously, an important aspect of enculturation is preparation for doing a job that is both socially useful and a means of earning a living.

But the developmental aims of education are getting increased attention today. In the newly modernizing nations, especially, education is being viewed as a powerful instrument for advancing toward goals that require of education, not the mere transmission to this generation of the heritage from past generations, but radical new departures. In some cases, notably in many African countries, the break with the past is very sharp indeed, as leaders endeavor to construct modern economies, policies, and social systems. In the newly developing countries of Asia and Latin America, the suddenness of the transition from premodern to modern is, by comparison with Africa, somewhat less. But everywhere in the "underdeveloped" world there are enormous gaps between the outlook, knowledge, and skills of the modern-minded people, mostly in the cities, who have absorbed important parts of today's world culture, and the great majority of the population who are still rural and generally much more tradition minded.

What are the most significant developmental tasks of education in these countries (besides the recurring and also changing tasks of enculturation)? In the broadest and most fundamental terms they are to help both young people and adults to acquire the knowledge, the skills, and the attitudes and values which will enable them to initiate, accept, and adjust constructively to the changes which are both conditions and consequences of modernization. Properly planned occupational education and training is one of the most important approaches to these developmental tasks. For the prospects of attaining desired economic, political, and social goals will be dim until the country concerned is able to produce appropriately qualified personnel to man the many new occupational roles that are essential in a modernizing society.

A GENERAL PLANNING MODEL FOR OET

The rest of this chapter will present in overview a suggested conceptual framework -- a pattern or model -- by which to plan occupational education and training to meet the need of development. Subsequent chapters will fill in details and discuss key issues and problems.

The suggested pattern departs in some respects from conventional practices. The novel features, however, are not entirely untested. Nearly all of them have been tried out here or there around the world and may be said to represent emerging best practices. Perhaps the main departure here is their integration into a combined whole.

It must be emphasized that this is a general, idealized model, not necessarily suited in all respects to any particular country. The basic approach is believed to be widely applicable, but details and implementation will, naturally, vary considerably depending upon such factors as the level of a country's development, the nature of its economic, political, and social system, its organizational and management "style," its existing educational and training institutions and their traditions, and the outlook and administrative capacities of its leaders in the public and private sectors.

One more preliminary remark. These concepts and the policy suggestions that flow from them are put forward in no dogmatic spirit. They have already undergone substantial modification in the light of discussions based on a preliminary version of this essay and subsequent rethinking. They are still tentative. It is hoped that their presentation here will contribute to a further process of analysis and discussion which will help all of us concerned with these important problems to progress further in our thinking. It has seemed best, however, to take positive positions and to state as clearly as possible the author's own present thinking on issues in controversy, while recognizing that on many important points the evidence is scanty and the arguments not all fully weighed. The hope is that this will sharpen the points at issue and stimulate conceptual and empirical research.

Education, Training, and Experience

It will be useful to think of the total process by which individuals acquire competence for occupational roles in terms of three components: education, training, and experience.

This study will distinguish rather carefully between education and training, despite the fact that these terms are often used loosely and interchangeably even in professional writings. In the context of preparation for occupational roles, education means instruction and learning broadly relevant to performance in all or a considerable number of occupational roles (as well as to a great many other purposes and life situations). Training, on the other hand, is instruction and learning concerned with good performance of a specific task or a set of tasks making up a job or occupation.[1] The distinction between education and training is mainly one of degree of specificity. There is no sharp dividing line; one merges into the other.

Besides the more structured forms of learning implied by the terms education and training, a third element in acquiring occupational competence is work experience. This term refers to the learning that takes place, much of it in an unplanned and unsystematic way, on the job, in the factory or workshop or service institution, or agricultural enterprise, or whatever the occupational setting may be.

Employers generally place a considerable value on work experience. In many kinds of jobs there are important aspects which, it seems, can only be learned in the real work situation, as a result of more practice or more diversified encounters with actual problems than even a good training program can provide. While many of the values of work experience come as a by-product of activities not specially planned for learning purposes, exposures to work experience can be planned as part of a conscious design for building occupational competence, and to some extent the nature of the work experience can be programmed. Thus, some employers move promising young executives from department to department to give them first hand experience in different aspects of the establishment's activities.

A Four-Phase Concept

Analysis of and planning for occupational education and training will be aided by thinking in terms of four phases or stages, as follows:

Phase 1. General Education

Phase 2. General plus Pre-occupational Education

Phase 3. Job-Entry Training, plus Further Education

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[1] This is consistent with a distinction that has been made in a more general context as follows: Training implies learning for use in a predictable situation, and education implies learning for use in unpredictable situations (Broudy, Harry S., B. Othanel Smith, and Joe R. Burnett: 1964).

Phase 4. Career-Long Further Training and Retraining, with Further Education.

Phases 1 and 2 under this concept will normally take place in schools, prior to employment, and will be the responsibility of the regular education system -- with cooperation, especially in Phase 2, from employing organizations. Phases 3 and 4 will normally take place in employment, partly in-plant or on-the-job, partly by outside institutional instruction, and the major responsibility for Phases 3 and 4, under the concept here put forward, will rest on the employment system as to training aspects and on the regular education system as to further education. Cooperation and joint action between the employment system and the regular education system and with other institutions and agencies capable of making a contribution in any of the four phases will be promoted by some type of joint Occupational Training Organization (OTO). Institutional and organizational matters will be discussed in Chapters IV and V.

Ideally, each individual would have the opportunity to pass these four phases, normally in the sequence indicated, thereby acquiring the education, training, and work experience needed for occupational competence in one or more fields appropriate to his talents and interests and to the needs of society.

The four phases need not be thought of as sharply distinct from each other. Rather, each phase represents a set of functions which, in the ideal case, are to be performed as part of the preparation for a person's occupational role or roles. These sets of functions partially overlap. In practice, the sequence often will not be a straight progression from 1 to 4; there will be skipping of stages, backtracking, and -- hopefully -- a good deal of making up later for previously missed opportunities. This applies all over the world, but especially in the newly developing countries where great gaps have existed and often still exist in the facilities for education and training. Many persons now working, especially in newly developing countries, have had little or no opportunity for general education in the formal sense, but they can benefit from additional training while on the job and from opportunities for adult education, the sequence in such cases being different from that indicated in the four-phase concept.

In other words, this is an idealized concept, not a picture of current reality. But it is useful as a normative model toward which to guide planning efforts. It is capable of being approximately achieved, though the process will take effort, time, and resources. Progress in this respect will, it is suggested, substantially aid in achievement of a country's development goals.

General Education

General education (Phase 1), besides enlarging the individual's horizon and preparing him for life in society and for citizenship, is a nearly indispensable foundation for all modern-type occupations. It should provide at least elementary skills in oral and written communication and computation, some knowledge of the physical, biological, and social world and of the humanistic heritage, and should contribute to formation of desirable attitudes, motivations, and values. General education, even in the primary school, should include some orientation to the world of work, not as specific vocational courses but woven into studies suitable to the age level about the physical, biological, and social environment. This would comprise elementary knowledge about what people in various occupations do and what they need to know, and ideally ought to involve some elementary simulated or actual work experiences.

General education will normally come in childhood and youth, but, ideally, with opportunities for broadening and deepening throughout the lifetime. Special provision needs to be made for adults to make up later for general education opportunities missed in childhood and youth.

As to the normal length of Phase 1, no general rule can be stated. Ideally, each person should have the opportunity to absorb as much general education as his aptitudes and interests suggest. In practice, the rule will often have to be, instead, as much as he and the country can afford. A minimum target should surely be completion of the four years or so usually required for functional literacy, or if possible, completion of the primary level by everyone. As the productivity of the country increases and resources permit, standards will rise and more and more people will be able to continue general education through some or all of the secondary level and -- as is already happening in the affluent countries -- a substantial proportion through two years of junior college or even a full length university course, in some cases followed by postgraduate work.

General plus Pre-occupational Education

In the last two or three years of general education, just prior to selected points at which substantial groups of students terminate their formal schooling, there should be a pronounced increase in the amount of attention devoted to pre-occupational elements. This stage will occur at different age and grade levels for different groups. At whatever level, the purpose would still be one of education, rather than very specific job training. But the education would be somewhat more focused toward skills, knowledge, and personality traits needed in a selected range of occupations, and there would be a really strong effort in the field of occupational orientation, labor market information, individual aptitude analysis, and career guidance and counseling.

The curriculum should provide for "streams" of students tending toward different clusters of occupations and, so far as possible, for individually adapted programs within the streams. The various occupational clusters would include, for example, mechanical, commercial, health, homemaking, teaching, scientific, and others. There would be some specialized subject matter for each stream and a common core for nearly all students.

The occupationally oriented content should still be quite broad, offering appropriate background for large groups of occupations rather than for very specific occupations or jobs. The aim would be to produce trainable rather than fully trained people. Fundamentals should be provided that make for initial employability, for ability to learn and relearn on the job, and for versatility and adaptability in relation to the many changes in the occupational environment that are likely to occur during an individual's working career. With these aims in view, the fundamental task of the student in school should be viewed as "learning to learn," and the task of the school authorities and teachers as stimulating and assisting him in this.

This concept of pre-occupational education recognizes the reality that large groups leave the school system at each of several different levels and that each leaving group deserves to be prepared as well as possible to find suitable employment, to learn on the job, and to continue to learn and relearn throughout a working lifetime.

It is problematic how much can really be accomplished toward providing pre-occupational education for the very large numbers who, in many newly developing countries, terminate at the primary level or even drop out before completion of primary school. The most important thing undoubtedly is to strive for functional literacy, basic skills in computation, and elementary notions of science and technology related to the physical, biological, and social environment. Such elementary education is needed as a foundation for learning on the job and for taking advantage of educational opportunities in adult life, and is likely to be more useful than any direct occupational preparation that can be assimilated at this stage of maturity. However, as much as possible should be done to broaden the pupils' information about the various kinds of occupational opportunities likely to be open to them and to give them an idea of the requirements for success in these occupations.

At the secondary and post-secondary levels, students who are likely to head toward employment in the mechanical trades should be given extra instruction in shop mathematics, mechanical drawing, use of basic hand and machine tools, and the proper maintenance of equipment. At the same time, they would continue their general education. Secondary and post-secondary students for whom a commercial occupation seems most likely and appropriate should have extra instruction in subjects like accounting, elementary management principles, and skills such as typing and use of office machines, along with continued general education. Those who show special aptitude and interest for health-related occupations (as physicians, dentists, nurses, medical assistants, pharmacists, etc.) should be guided into extra courses in the biological sciences, chemistry, and the human and social problems related to health. Similarly, other "families" or "clusters" of occupations should be given a place in pre-occupational education -- for example, agriculture, public administration, hotel and restaurant occupations, and management of independent small enterprises. Decisions on which programs to offer or to stress should be made with a view to the country's emerging occupational opportunities and needs, and also with very careful consideration of the locally available opportunities for employment. This latter requirement can best be met by means of local surveys and active advisory committees.

The aim of each such program, to repeat, should be to produce not fully trained people but trainable and employable people, equipped with basic skills, knowledge, and personality traits that will enable them to learn quickly any of a variety of specific jobs within a fairly wide range of related occupations consistent with the particular individual's ability and interest. This approach assumes, it must be emphasized, that opportunities for specific training and for further education will be available in employment (see Phases 3 and 4). Here is undoubtedly one of the greatest weaknesses in the existing occupational education and training systems of most countries, especially the newly developing countries, and one of the greatest opportunities for improvements that would bring immediate returns in higher productivity. If training can be provided largely in employment, the regular education system can be relieved of specific training tasks which it is not well staffed or equipped to perform and can concentrate on education -- general education, topped off toward the end of each person's schooling with occupationally oriented education.

An extremely important part of the pre-occupational stage of education is generally not provided in the newly developing countries, and this lack offers a definite opportunity for immediately beneficial improvement. There is usually an unfilled need for occupational information and counseling, including information about the different types of jobs, their requirements, and the outlook for various careers. This should be closely related to individualized aptitude testing, followed by guidance to the student in forming realistic ambitions and preparing for intelligent choices among occupational possibilities. Provision for work experience -- real, if this can be arranged with employers on a part-time or vacation-time basis, or simulated work experience in various types of school programs -- can help greatly in basic preparation for work and in occupational choices.

Job-Entry Training and Further Education

At the point of entry into the first regular job, or shortly before or after, specific job training should take place. This should be combined, if at all possible, with some form of further education. The desirable general principle is to avoid very specific training (as contrasted with education) prior to and unconnected with employment; instead, specific training should accompany entry into employment or into a rather definite employment commitment -- such as sponsorship of a student in a technical school by an employing establishment which expects to hire him at the end of his course. However, there are many situations in which this principle cannot be applied, and it has to be interpreted flexibly.

The specific job training should, wherever feasible, be conducted by or in close cooperation with the employing organization. In fact, one of the aims of human resource developers should be to cause every employing organization -- government agencies and private employers alike -- to function also as a training organization, either through its own programs or by cooperating with other employers or with appropriate education and training institutions in arranging for and paying for training programs.

Job-entry training programs can usefully combine three elements: 1) orientation to the job, 2) training specific to the job, perhaps partly within the employing establishment itself and partly in an outside classroom, laboratory, or teaching workshop, 3) work experience in a production situation, under guidance, and 4) further education, to continue general and occupational education, to remedy deficiencies, and to build further on the individual's particular educational background.

Career-Long Further Training and Retraining, with Further Education

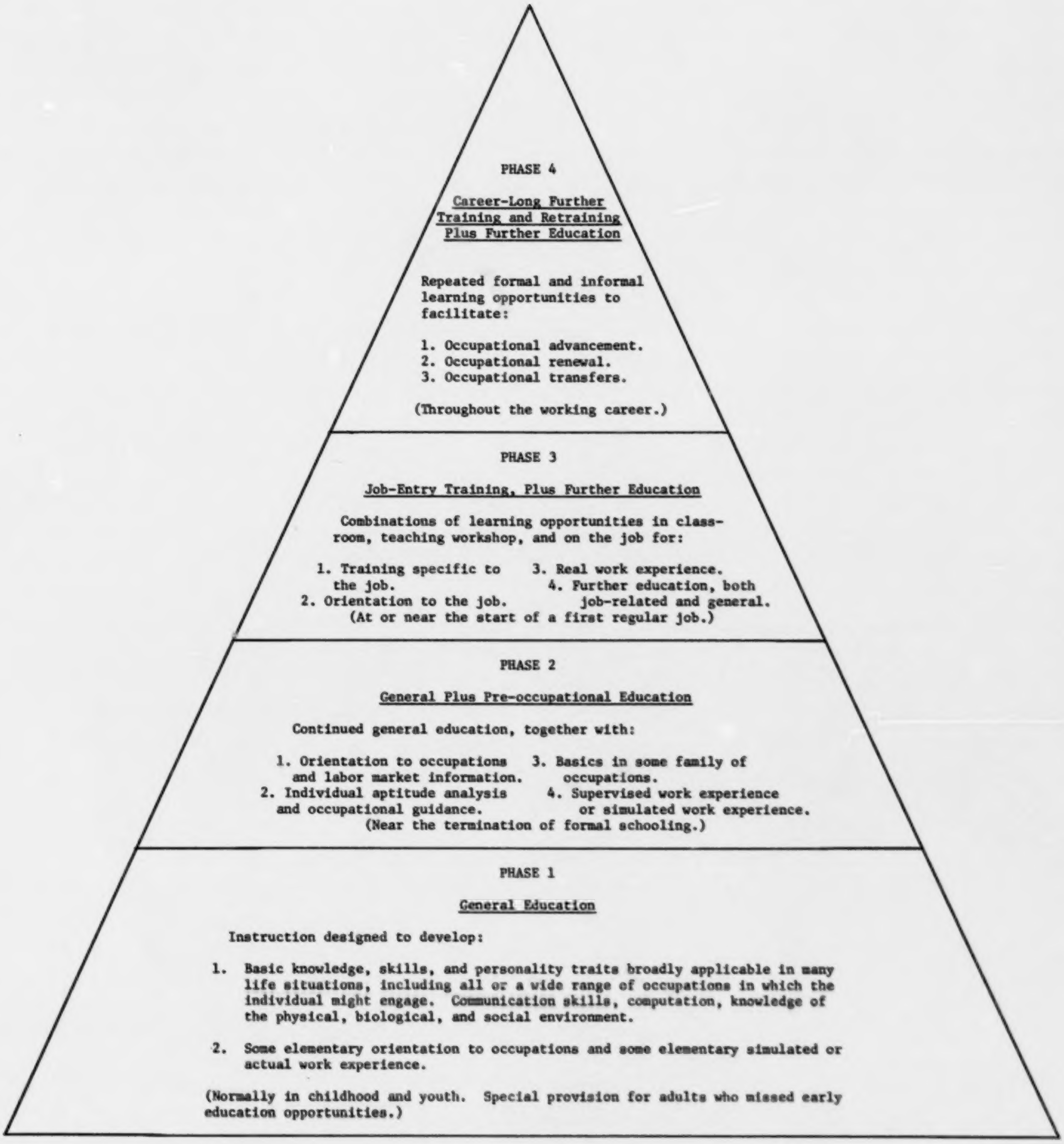
Finally, opportunities should be systematically provided for additional training or retraining and for further education throughout each individual's working career. This is probably the most neglected area in the planning of OET, and it may be the one where added attention and investment will yield the largest immediate returns.

The direct purposes in this phase are three: 1) advancement of the individual's occupational competence, enabling him to do his particular job better or to move to the next higher job, as when a farmer learns to use improved seeds and fertilizers or an electronics technician by study and experience moves up to be an electronics engineer; 2) renewal of qualifications in a trade or occupation, updating knowledge and skills to keep abreast of technological and other changes, as when a plumber skilled in handling steel pipe learns to handle plastic pipe or a physician learns about new antibiotics; and 3) transfer to a different job or occupation requiring a different set of skills, knowledge, and perhaps even personality traits, as when a coal miner, whose job is eliminated by mechanization, retrains to be a radio repairman, or a mechanic becomes a salesman, or an engineer becomes a manager or an independent entrepreneur and, therefore, needs to learn about administration, marketing, and finance.

The methods appropriate at this stage are extremely varied. They range from formal schooling to informal learning situations hardly perceived as such but perhaps very effective because they are immediately relevant and highly motivated. The formal schooling may consist of elementary or secondary instruction resumed after interruption, or perhaps remedial education at the frontiers of knowledge. The informal learning situations might include meetings of trade associations and professional groups, technical seminars and conferences, trips to other parts of the country or abroad, reading of trade and professional journals, certain kinds of radio and TV broadcasts, and the like.

Chart 1-1 sums up the main features of the conceptual framework sketched in this chapter.

Subsequent chapters will build upon this framework. Chapters 2 and 3 are concerned with planning the content of occupational education and training in each of its four phases, Chapters 4 and 5 with institutional and organizational choices.



PHASE 4

Career-Long Further Training and Retraining Plus Further Education

Repeated formal and informal learning opportunities to facilitate:

1. Occupational advancement.
2. Occupational renewal.
3. Occupational transfers.

(Throughout the working career.)

PHASE 3

Job-Entry Training, Plus Further Education

Combinations of learning opportunities in classroom, teaching workshop, and on the job for:

1. Training specific to the job.
2. Orientation to the job.
3. Real work experience.
4. Further education, both job-related and general.

(At or near the start of a first regular job.)

PHASE 2

General Plus Pre-occupational Education

Continued general education, together with:

1. Orientation to occupations and labor market information.
2. Individual aptitude analysis and occupational guidance.
3. Basics in some family of occupations.
4. Supervised work experience or simulated work experience.

(Near the termination of formal schooling.)

PHASE 1

General Education

Instruction designed to develop:

1. Basic knowledge, skills, and personality traits broadly applicable in many life situations, including all or a wide range of occupations in which the individual might engage. Communication skills, computation, knowledge of the physical, biological, and social environment.
2. Some elementary orientation to occupations and some elementary simulated or actual work experience.

(Normally in childhood and youth. Special provision for adults who missed early education opportunities.)

CHART 1-1: THE FOUR PHASES OF OCCUPATIONAL EDUCATION AND TRAINING

CHAPTER 2

ANALYZING NEEDS

The logical starting point for planning a developing country's occupational education and training system is analysis of its emerging needs for qualified personnel. The term "qualified personnel" here, and throughout this study, means persons who have acquired appropriate combinations of skills, knowledge, and personality traits that fit them for occupational roles in the economic-social-political system.

To neglect systematic analysis of needs may result in expensively wasteful efforts to produce the wrong kinds of skills, while really urgent requirements for other types of skills that are so scarce as to constitute bottlenecks in the country's development go unattended. For example, to help develop industry, and because secondary school graduates are having trouble finding jobs, it may be decided to establish more vocational secondary schools. Certain trade courses may be set up that have been traditional in such schools, without a real attempt to study the local and national labor market. The graduates, after several years of preparation, may find that the trades in which they are trained are no longer in much demand, or that very few industries which offer jobs in these trades have yet developed in the area, or that there is already an oversupply of workers to fill the jobs that are available. At the same time, it may be that one of the causes of lack of jobs is a lag in the area's development, partly due to a shortage of good entrepreneur-managers. Or the need for better-qualified farmers, extension workers, and tradespeople providing supplies and services to farmers may be holding back the modernization of agriculture in the area, which in turn limits the demand for workers in the industrial and service occupations.

As implied by these examples, the analysis of needs on which to build programs of occupational education and training must not be limited to national or even regional aggregates and averages. Just as important, even more important when it comes to planning specific programs, is analysis of needs in each local area to be served. The situation in some of these areas is sure to be far different from the national average. Remember the unwary statistician who drowned while crossing a river with an average depth of three feet!

This chapter will propose an integrated approach to the planning of occupational education and training. Such an approach begins by surveying the whole array of the country's activities that, in the light of development plans and objectives, will require qualified personnel. It proceeds to the needs of each sector and subsector and ultimately, at the point of action, to each locality and each employing establishment (public and private) and to important groupings of small establishments and self-employed persons.

The analysis should be both quantitative and qualitative. An important difference between the planning procedure advocated here and that often associated with "manpower planning" is that much more emphasis is here put on the qualitative aspects. Proper planning of OET consists not merely or even mainly in determining the amounts of education and training to be provided at various levels and under various program and course labels, but it is also necessary to plan carefully for the most suitable content of the curriculum and of each course or other unit of instruction, as well as to give thought to the methods of instruction. (Methods of instruction influence the effective content; an inquiry method may produce a different product than a rote-learning method, even when supposedly the same subject matter is under study.) Content and content-influencing methods of instruction must be sought which will best serve the country's developmental needs. This requires information and thought about the kinds of skills, knowledge, and personality traits that are essential or desirable for good performance in all the most important types of occupational roles.

ACTIVITIES REQUIRING QUALIFIED PERSONNEL

To gain perspective on the whole range of tasks that an ideally perfect plan of OET would have to confront, it may be worthwhile to experiment briefly with a classification of all the activities that, in a modern or modernizing economic-social-political system, require qualified personnel. Such a classification is offered in Figure 2-1.

Figure 2-1

MAJOR GROUPS OF ACTIVITIES REQUIRING QUALIFIED PERSONNEL

1. AGRICULTURE AND CLOSELY RELATED SERVICES

    1.1 Farming
    1.2 Forestry
    1.3 Fishing
    1.4 Services closely tied to the foregoing
        1.41 Special supply services (seeds, fertilizers, implements, etc.)
        1.42 Special marketing services
        1.43 Special advisory, technical, and research services
        1.44 Special financial services

2. INDUSTRY AND CLOSELY RELATED SERVICES

- 2.1 Manufacturing
- 2.2 Mining
- 2.3 Construction
- 2.4 Transportation
- 2.5 Communications
- 2.6 Electricity, gas, water
- 2.7 Services closely tied to the foregoing
  - 2.71 Special supply services, including installation-maintenance-repair of equipment
  - 2.72 Special marketing services
  - 2.73 Special advisory, technical, and research services
  - 2.74 Special financial services

3. GENERAL SERVICES

Note: There is overlapping between services listed here and the specialized services closely tied to agriculture and industry listed above. For the present purpose of noting the wide range of activities requiring qualified personnel this is not harmful. For statistical purposes, mutually exclusive subcategories would have to be developed, and the special relevance of some service subcategories to agriculture and to industry could be noted.

- 3.1 Government, Politics, Law
  - 3.11 Public administration
  - 3.12 Legislative and judicial services
  - 3.13 Military and police services
  - 3.14 Political party leadership, management and running of political associations
  - 3.15 Legal services
  - 3.16 Other

- 3.2 Commerce and Finance
  - 3.21 Wholesale trade
  - 3.22 Retail trade
  - 3.23 Independent small service enterprises (including installation-maintenance-repair, for example, plumbing, automobile servicing, radio-TV servicing, etc.)
  - 3.24 Banking, credit, and investment services
  - 3.25 Insurance services
  - 3.26 Other

- 3.3 Food, Travel, Tourism, Recreation
  - 3.31 Restaurant services
  - 3.32 Hotel services
  - 3.33 Travel services
  - 3.34 Other tourist services
  - 3.35 Theatres, movie houses, etc.
  - 3.36 Other recreation services

- 3.4 Health
  - 3.41 Professional services - physicians, dentists, radiologists, etc.
  - 3.42 Supporting services - qualified technicians and assistants, dental hygienists, pharmacists, laboratory technicians
  - 3.43 Hospitals, nursing homes, other institutionalized health care - administration and staff services
  - 3.44 Public health - administration and services

- 3.5 Education and Training
  - 3.51 The regular school system - primary, secondary, and higher education
  - 3.52 Adult education programs and institutions
  - 3.53 Other special-purpose programs and institutions
  - 3.54 Education and training in employing establishments
  - 3.55 Educative services - in connection with agricultural and industrial extension work, public health work, community development

- 3.6 Social Communication
  - 3.61 Editing and publishing of newspapers, magazines, books
  - 3.62 Broadcasting by radio, TV
  - 3.63 Communication activities of trade unions, employer's associations, trade associations, professional associations, and many others

- 3.7 Research, Advisory Services
  - 3.71 Research activities in educational institutions, industry, government agencies, special institutions
  - 3.72 Advisory and consulting services for agriculture, industry and commerce, others

- 3.8 Homemaking and Household Services
  - 3.81 Homemaking, parenthood, child upbringing
  - 3.82 Domestic service

This classification distinguishes three major sectors: agriculture, industry, and services. Empirical studies of modern economic growth show that usually the industrial sector grows most rapidly as development proceeds and, therefore, increases its relative share in the total labor force. Agriculture grows least rapidly, and its relative share in the labor force declines. The trends in the share of the services sector with respect to the total labor force are not consistent among countries; in some there is relatively little change, but in a greater number of others there is a large absolute and relative rise. [Kuznets 1966, Ch. 3.]

Though the industrial sector generally has the most rapid growth rate as modernization proceeds, in newly developing countries it starts from a very small base. Also, productivity per worker rises with modernization; therefore, growth in industrial output can take place without increasing industrial employment at anywhere near the same rate. Consequently, the absolute increase in the industrial labor force from year to year in many, probably most, of the newly developing countries is bound to be small in relation to the large numbers employed in the more traditional occupations, especially in traditional agriculture. At the same time, population is growing rapidly. Also, educational opportunities are spreading to wider segments of the population, and it seems to be a fact that even a little education tends to make people want to get out of traditional occupations, particularly subsistence agriculture, into modern, urban occupations. The upshot of all these tendencies is that in many, probably most, of the newly developing countries industrial growth alone will by no means be able to provide jobs for the increasing numbers of people, especially young people, who will be seeking modern-sector jobs. If, in these countries, the employment problem is to be met at all during the years immediately ahead, it will have to be met largely in the agricultural and services sectors.

This, then, is a powerful argument for paying more attention to the transformation of agriculture and rural living, so as to increase the attractiveness and holding power of agriculture-related activities and slow down somewhat the pell-mell rush to the cities. Expansion of agricultural employment and employment in agricultural services in villages and towns, is, in many countries, the main real possibility within the next decades for matching job demands with job opportunities. There are, of course, other reasons for urgent attention to agricultural development in these countries -- food needs, and the interdependence of agricultural and other development. The kind of agricultural development necessary to cope with these problems is rapid modernization, not in the sense of mechanization (at least, not where there is superabundant population) but of radical improvements in production technology to increase yield per acre and per man while employing nearly as many people as before or even more. This happened in the modernization of Japan. It requires improved seeds, fertilizers, insecticides, irrigation, better tillage methods, to accompany a shift from subsistence to market-oriented agriculture. All this demands more highly qualified farmers, farm advisers, and qualified personnel to man a multitude of agricultural services for supplying the new inputs and marketing and processing the products.

This need for an agricultural-rural transformation poses large requirements for various types of qualified personnel. Yet nearly all of the so-called manpower plans to date have tacitly limited their planning almost entirely to the needs of the modern urban sector, not facing up to the problem of qualified personnel to transform agriculture, agriculture-related services, and rural living.

PROJECTING QUANTITATIVE REQUIREMENTS FOR QUALIFIED PERSONNEL

One of the tasks in planning occupational education and training for development is to estimate how many persons with certain levels and types of qualifications (professional engineers, skilled machinists, secondary school teachers, etc.) will be required in the employment system[1] during the years ahead. This, together with data on the out-turn of the education and training system and wastage rates, makes it possible to anticipate probable shortages and surpluses and to take appropriate action. Judgments have to be reached as to what amounts and kinds of education and training will yield the most substantial benefits in relation to the costs -- benefits being estimated in terms of the anticipated contribution to the development objectives of the country and costs in terms of the scarce resources, particularly personnel and funds, that have to be used.

An initial point of departure for such judgments can be provided by manpower requirements projections, preferably linked to realistic development plans. Techniques for making quantitative surveys to determine the present utilization of qualified personnel and techniques for projecting future requirements have been developed in recent years and are now widely practiced. The best guide to these techniques and their application in educational planning is a small volume prepared for OECD's Mediterranean Regional Project by Herbert S. Parnes, Forecasting Educational Needs for Economic and Social Development, 1962. It outlines methods for estimating future manpower requirements in terms of occupational categories and then for converting the occupational requirements into requirements for levels and types of education.

Since these procedures are well described by Parnes and adequately exemplified in a considerable number of studies, they need not be dealt with in detail here.

Limitations on Projections

However, certain limitations on quantitative projections of manpower requirements should be noted, for they affect the design of an occupational education and training system. All such estimates, especially in countries where a drastic break with the past is underway, are bound to be imperfect. Also, it is usually not feasible to cover in specific detail all the many types and subtypes of specialized occupations for which qualified personnel will be needed as development goes forward. Nor is it usually possible to take adequately into account the many transfers of personnel between occupations, the continual ups and downs of demand for various kinds of skills occasioned by technological changes, shifts of demand for various products, new directions in the government's development policy, and other factors. Refinements of such projections can become a waste of scarce talent, especially where the data on which they have to be based are untrustworthy or even conjectural. It would be more rewarding in such cases to devote equivalent effort to gathering better data on the current manpower employment situation.

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[1] "The employment system" is a term that will be used to denote the sum total of occupational roles and of employing establishments in a country.

These considerations have three very important policy implications:

First, it is desirable to organize for quick and continual feedback from the employment system to the occupational education and training system; that is, realistic current reports on the changing demand and supply situation in relevant segments of the labor market and on the matching or mismatching of instructional content to real on-the-job needs should be brought to the attention of those who plan OET programs. Thus, wrong anticipations about the required numbers for various occupations and about the kinds of preparation really needed can be more quickly discovered and corrected.

Second, a basic aim in OET policy should be to produce reasonably versatile persons, able to learn new skills quickly and to transfer, with some retraining, from one specific job to another over a fairly broad range of jobs. This will minimize the losses to individuals and to society from wrong anticipations of future needs and will facilitate quick adjustment to the occupational changes sure to come with changing technology.

Third, OET programs should provide not only for initial preparation of persons to meet present job requirements but, equally important, for continual opportunities of retraining and further education throughout a working lifetime, so as to facilitate mobility within and between occupations.

Classifying Occupations

As reported in the Parnes-OECD volume, the Mediterranean Regional Project developed an occupational classification scheme which is an adaptation of the International Standard Classification of Occupations (I.L.O. 1958). The project leaders agreed that:

(a) Manpower analysis for purposes of educational planning requires an occupational classification system which is, as far as possible, convertible into corresponding categories of educational qualification.

(b) The most useful occupational classification system for the Mediterranean Regional Project would be an adaptation of the International Standard Classification of Occupations, since this has been designed to accommodate the occupational structures of diverse economies at varying stages of economic development. Moreover, since it includes detailed occupational definitions, it allows occupations to be classified on the basis of their actual functional content, thus minimizing the difficulties that arise out of differences in the meanings of national occupational titles.

(c) The classification system used in the project should be more detailed at the higher than at the lower occupational levels. The former include the occupations for which training time is generally long, and among which education and training are less transferable than among those lower in the occupational structure.

(d) As a minimum, the amount of detail in the classification system should be such as to permit differentiation between those occupations that require "technical" and those that require "liberal" education. Without such differentiation, useful estimates of teacher requirements and of educational costs cannot be made, for it is considerably more expensive to train a technologist than, say, a social scientist. In those countries whose data permit it, it would be desirable to have a more detailed breakdown than the foregoing, differentiating, for example, between engineers and scientists.

(e) The occupations listed in the International Standard Classification of Occupations should be fitted into four broad classes:

Class A: All occupations for which a university education or an advanced teachers' college degree, or its equivalent, would normally be required.

Class B: Occupations for which two or three years of education beyond the secondary level (12 years) may be required.

Class C: Occupations for which a secondary school education (either technical or academic), or its equivalent, would normally be required.

Class D: All occupations not included in Class A, B, or C.

These are excellent principles, but two improvements might be suggested.

In the first place, the International Standard Classification of Occupations (ISCO) needs some further development to serve adequately for social and political occupations. The many sub-occupations involved in health services and educational services receive much less meticulous classification than those concerned with the building and operation of various kinds of machines. Also, the ISCO reflects the conventional bias of economists concerned with market values and leaves the (unpaid) occupation of housewife and homemaker out of the picture, though paid housekeepers and maids are included. Better qualified homemakers, however, may be quite strategic in development. Their role will enter our discussion again in connection with the relation of child nutrition and parental knowledge and attitudes to intelligence level, achievement motivation, and other personality traits in the rising generation. Again, the ISCO deals less than adequately with sub-occupations required for effective development of a modern polity (party officials, legislators, administrative sub-occupations, etc.) and of modern social services.

In the second place, the OECD's differentiation among occupations according to requirements for "technical" or "liberal" education (see paragraph (d) in the quoted material) and its implicit definition of "scientific" and "technical" throughout the volume as limited to the natural sciences and their applications leaves much to be desired. It neglects social science and social technology, or fails to distinguish between these and purely humanistic pursuits such as poetry and music. Occupational and educational planning -- including planning for courses of study, teacher requirements, and equipment requirements -- will be better served by a tripartite classification of sciences and technologies into physical, biological, and social. A further distinction can then be made between all these sciences and technologies on the one hand and humanistic studies on the other. (For more discussion, see the next section, under "Knowledge").

QUALITATIVE ANALYSIS OF PERSONNEL REQUIREMENTS

Qualitative planning for occupational education and training begins with an effort to specify the desired "products." That is, what skills, knowledge, and personality traits are desirable (perhaps not ideally, but within reasonable limits of feasibility) for each of the more important types of occupational roles which will need to be filled as the country's economic, social, and political system modernizes and develops? This should lead into systematic and continually experimental effort to adapt and invent course contents and instructional methods that are most likely to produce properly qualified personnel.

Occupational Analysis

Occupational analysis consists in careful specification -- based on direct observations and on testimony of practitioners, supervisors, employers, and other experts -- of the functions and tasks actually performed in given occupational roles. Detailed analysis should first be undertaken of the groups and subgroups of occupations estimated to be the most strategic to the country's development. Then the analysis should be extended to as many as feasible of the important specific occupations. What is required is not a one-time study, but a continual series of studies, to keep abreast of changing requirements of the employment system and to provide rapid feedback to the education and training system. In qualitative as in quantitative planning, the key to success is to institutionalize this continual feedback so that corrections and improvements are constantly made.

The information about desirable qualifications in important groups of occupations should serve as a basis for curriculum construction and course planning in educational institutions, also in extra-school education and training programs such as those of employers and trade unions.

The question immediately arises: are "desired qualifications" to be interpreted as (1) those actually observed under present practices, (2) what employers say they would like, or (3) some optimum set by experts, perhaps higher than either of the foregoing? The problem can be illustrated by qualifications of primary school teachers. In some countries the actual qualifications of teachers now on the job are extremely low; sometimes their own formal education hardly extends beyond the primary, if that. It would be self-defeating simply to ascertain the present reality and accept that as a standard. On the other hand, standards that experts would regard as ideal are probably not feasible for the near future. The best policy in such a situation is usually a combination of (1) preparing new entrants to the occupation to meet target standards considerably above the present reality but probably short of the ideal, and (2) mounting a vigorous in-service program of additional training and education to improve the qualifications of those already active. Then, gradually and progressively, the target standards for "desired qualifications" can be raised.

Skills, Knowledge, and Personality Traits

An analytical framework for analyzing desired qualifications in different occupations or occupational groups is offered below under three main headings: skills, knowledge, and personality traits.

SKILLS

The ability of an individual to perform certain kinds of tasks with more than usual proficiency, as measured by quality of result and economy of effort, is what we mean by skill. There are skills very specific to particular jobs, like the skill of the lens grinder. Others are applicable to a wide range of jobs, as is true of mathematical computation, writing and speaking, or organizing. There are manual skills and mental skills, also skills that combine the two in complex ways, as in the work of a construction foreman or an electronics repairman. Some skills are primarily analytical, such as those used by the chemist in an industrial testing laboratory. Others have a large synthetic or creative element, as in the case of a designer developing a new product, a research scientist building a new theory of fatigue in metals, or an inventor devising a new industrial process and an entrepreneur putting it into practice. There are individual skills and social skills, the first exemplified by the craftsman working alone, the second in the human relations arts used by a manager, a foreman, a trade union leader, or a politician.

Skills can be broken down into their component parts -- general skills like reading and writing, computation, etc., and specific skills like the operation of a punch press or how to make a market survey. When this is done systematically and continually, it should be possible to increase the efficiency of education and training by building into general education programs those skills that are most widely used and transferable, while narrowing down successively to more and more specific skills in pre-occupational education programs and in training programs.

The following breakdown suggests major types of skills that should be considered when analyzing the education and training needs of specified occupations:

1. Communication skills -- speaking, reading, writing (in mother tongue, national language, a world language)

2. Computational skills

3. Mechanical skills

4. Human relations skills

5. Analytic skills -- facility in scientific methods of analysis, including mathematics, statistical methods, laboratory techniques, etc.

6. Synthetic skills -- creative design, invention

7. Learning skills

8. Skills specific to particular occupations or tasks

KNOWLEDGE

To perform well in a given occupational role a person needs a certain range of factual knowledge (narrow for some occupations, very broad for others) and, more fundamental, a certain range of understanding. This means a comprehension of the way things and events affect each other, which rests fundamentally on familiarity with and ability to use concepts and theories that help in discovering cause and effect relations. Knowledge of the concept of microorganisms and their role in the causation of disease enables the public health physician to fight epidemics and the mother to protect her child against infections. Knowledge of the interrelations of savings, investment, and the price level in an economic system helps the economic technologist to plan measures for checking price inflation. Knowledge about the lives of great leaders of the past or familiarity with great literature and drama may provide inspiration and a set of values to a political leader or fire the ambitions of a school child.

It is not easy to decide, and probably impossible to decide with precision and confidence, what kinds of knowledge constitute the minimum essential or the optimum for a specified set of occupations. Broad perspective and unconventional bits of knowledge may make the difference between creative innovation in a job or routine performance. However, it is necessary to make decisions about what things to stress when planning a curriculum of education and training to prepare for a certain kind of occupation. The following framework may be useful as a checklist:

1. General information to live by:

   Loosely structured knowledge, often not systematically or critically examined, about one's own environment and the ways of one's own people and what results are likely to flow from various kinds of action.

2. Scientific knowledge:

   Understanding of interrelationships (cause and effect), in terms of carefully defined concepts and carefully examined and tested propositions.

    a. Physical (as in physics, chemistry, astronomy)

    b. Biological (as in physiology, bacteriology, genetics)

    c. Social (as in economics, cultural anthropology, sociology, political science)

3. Technological knowledge:

   Knowledge about ways of manipulating the physical, biological, or social environment for practical purposes.

    a. Physical (as in civil engineering, electrical engineering, the craftsman's knowledge of materials and tools, etc.)

    b. Biological (as in agriculture and animal husbandry, manufacture of antibiotics, food preservation, etc.)

    c. Social (as in economic development planning, management of a factory, administration of a social service, political leadership, etc.)

4. Humanistic knowledge:

   Appreciative understanding of man's aspirations, strivings, achievements, and failures.

    a. History of man's biological and cultural evolution, of science, of recent economic-social-political developments affecting mankind and that segment of mankind closest to home.

    b. Creative arts, such as music, literature, painting, sculpture, architecture, the theatre, the dance.

    c. Knowledge of the values of mankind portrayed in philosophies, ethics, and religions.

5. Knowledge specific to particular occupations or tasks.

We distinguish in the foregoing between physical sciences, biological sciences, and social sciences and make a similar grouping of technologies: physical technology, biological technology, and social technology. Physical technology is what is often called simply "technology." It is systematic knowledge of how to make use of physical materials and principles, as in the work of craftsmen or engineers who know how to build a bridge or an automobile, design an irrigation system, or run a chemical plant. Biological technology, of course, deals with plants, animals, and humans. It is illustrated in the work of farmers as they grow crops and raise livestock and of physicians as they prevent and cure illnesses. Social technology makes use of economic-social-political-psychological knowledge and principles of action for practical purposes, as in the work of managers, public administrators, politicians, and educators.

A few words should be said about the importance of social technology, along with biological and physical technology, and about the importance of social science studies, as well as those on physical and biological sciences, in school curricula. "Science," despite the rapid progress of the social sciences in this century and their applications in social technologies, unfortunately is still too often interpreted to mean only "natural science" -- that is, physical and biological.

Modern industrial activities are strongly dependent on sophisticated physical technologies (for example, in steel making, electronics) and on biological technologies (for example, in the pharmaceutical industry). But modern industry rests equally on sophisticated social technologies. A factory outfitted with the best of physical equipment can be a colossal failure if it lacks good social technology to deal with organizational, managerial, and human relations problems. If one could make a careful analysis of the number of man hours spent in industry performing tasks that relate mainly to organizational, institutional, and interpersonal relations (hiring people, supervising them, selling, relations with government, etc.) as compared with the hours spent on purely physical operations (machining metal, handling freight, painting, etc.) the result might change concepts about the most widely needed qualifications in industry. Almost certainly, activities embodying social technology would dominate among personnel at the higher levels. This might even be true in jobs filled by persons trained in physical technology, such as supervising engineers. Among the top leadership jobs in industry, where the crucial decisions involve goal-setting and value judgments, the most important qualifications may not be so much technological (even including social technology) as humanistic or philosophical. The same is true, of course, in government, in education, and in most other realms important in development.

In agriculture, of course, biological technology is the foundation. Farmers and farm advisers are better qualified when they have a good understanding of how things grow -- that is, a grounding in the biological sciences. But agriculture also involves much physical technology, in the form of water systems, use and maintenance of tools and equipment, transport, and construction. Finally, the experts on agricultural education point out that the successful modern farmer must above all be a good manager. He must make decisions not only about soil, water, plants, and animals, but also about when and where to buy and sell, how to adjust his production plans to anticipated market prices, when to borrow and not to borrow, and so on. As agriculture shifts from traditional subsistence farming to more specialized and market-oriented production, the farmer needs a more sophisticated understanding of economic, social, and political factors in his environment and how to cope with them -- that is, elementary social science and practical social technology.

As for the service activities, nearly all rest more heavily on social technologies than on physical or biological technologies. This is obvious in the case of services like education, government, and finance. Even health services, built though they are on biological and physical bases, have a strong component of social technology. The social aspect is especially prominent in public health work. For example, vaccination against smallpox was invented by Dr. Edward Jenner in England and made known by him in a publication of 1798, but effective control of smallpox, even in Europe, required another century and more. This was because social technologies had to be developed to put the biological technology (which also improved, of course) into wide enough use. But aside from public health work, important aspects of medical practice, nursing, hospital administration, and other health-related activities demand social knowledge and skills as well as biological-physical. "Nearly everyone in health services who has actual contact with patients or their families needs a heavy social technique component in his education. Some research indicates that in certain aspects of illness social support may be more important than [biological and physical] technology."[2]

PERSONALITY TRAITS

To denote the dispositions, motivations, attitudes, and values which influence a person's performance in a job we shall use the term "personality traits." It is a common observation that many people who are rather competent in terms of skills and knowledge fall short of what they could accomplish in their occupational roles because they are unable to cooperate well with other people, or lack integrity, or do not have the "achievement motivation" which manifests itself in a striving for excellence, setting progressive but realistic goals, and working hard to attain them. The scientific attitude of honest, careful inquiry and the technological attitude that "there must be a better way" are particularly desirable qualifications for all kinds of leadership roles in development, not only at the top levels but all through the employment system as in the case of progressive farmers.

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[2] Personal communication from Mrs. Barbara Killen, Project Coordinator, Center for Research and Education in Health Occupations, the American Rehabilitation Foundation, Minneapolis, Minnesota, U.S.A.

The following is a checklist of personality traits which, while probably desirable in any occupation, may have different degrees of importance with reference to particular occupations and groups of occupations:

1. Intelligence - adaptability, alertness
2. Achievement motivation
3. Scientific and technological attitudes - inquiring, innovative approach
4. Integrity - honesty, reliability
5. Readiness to cooperate with others
6. Personality factors specific to particular occupations or tasks.

Can Education and Training Shape Personality Traits?

While it is well established by experience in many countries that education and training programs can impart skills and knowledge, one may reasonably question how effective any planned programs can be in shaping personality traits. This is an extremely important question for education generally, and particularly for preparation to perform well in occupational roles. There is a vast amount of literature bearing at least tangentially on it, but the amount of hard, carefully verified evidence and clearly stated conclusions seems to be relatively scanty. The following brief discussion represents no more than the present and tentative views of a non-expert in this field who has, nevertheless, tried to enlighten himself as to the current "best thinking" of psychologists, cultural anthropologists, and educationists by reading some of what they have written and by discussions with colleagues. The topic is one of such importance and the foundations of knowledge about it so shaky that it would seem to deserve a great deal more research effort. At the same time, it is one of those areas where planners of education and training programs do have to act on some assumptions, using the best knowledge that they presently think they have, well verified or not.

According to much of current social science thinking, personality traits like those listed in the second paragraph above are rooted in a combination of inherited capacities and a particular cultural environment. The latter impinges most powerfully on the individual in infancy and childhood, especially through the family. By the time the individual comes into a formal education system, and especially when he is old enough for occupational education and training, fundamental personality traits are fairly well set. Still, there is some plasticity, and there is reason to believe that education and training programs can be devised which have a significant impact on at least some of these traits.

Intelligence, or mental alertness and adaptability, while certainly greatly dependent on heredity, is also subject to environmental influences. Malnutrition, especially in childhood, can have a very unfavorable effect, as can cultural deprivation which prevents a child from being sufficiently exposed to favorable mind-forming experiences. Malnutrition is in some cases due not so much to lack of proper foods or general poverty as to ignorance on the part of the mother, and where this is the case parent education might result in a better-nourished and, therefore, more alert next generation. Methods of child upbringing might be taught, even to illiterate parents, which could perhaps have favorable effects on the mind forming of their children. Parent education, nursery schools, and special school programs for disadvantaged children are possible ways to try to counteract the unfavorable effects of cultural deprivation on intelligence.

Achievement motivation means striving to do well with respect to some standard of excellence, setting standards of performance for oneself, and finding rewards in having accomplished something. Achievement motivation has been much studied by psychologists in recent years, notably by David C. McClelland of Harvard and his co-workers. (See McClelland 1961, 1966.) They have developed ways of measuring "need for achievement" or "n-ach" by exploring fantasies through projective techniques. For example, respondents are asked to react to pictures or anecdotes depicting various human situations, and their responses are scored for motifs known to be characteristic of persons with high need for achievement. They have also estimated the need for achievement in different societies at different epochs by scoring folk tales and stories for children.

McClelland has adduced much evidence that societies strongly infused with achievement motivation are likely to have more rapid economic development than societies where the people are less achievement motivated. The achievement motive, like other personality traits, is strongly conditioned by the upbringing of children -- for example, whether the mother expects and encourages the child to be active and energetic, to try to do hard things for himself, to overcome obstacles, and to do well in competition. In this connection, the relevant education and training programs would seem to be for parents, on how to bring up their children. But some experiments by McClelland and associates also give strong indications that even in adults achievement motivation can be significantly increased. They have used fairly simple and inexpensive conference techniques. (McClelland 1966.) Preliminary results certainly warrant further and more extensive experimentation. It may be that in this area of motivational psychology there are unexploited opportunities for education and training programs that could yield very high benefits.

To what extent can education and training impart a "scientific attitude," meaning a disposition to inquire objectively and systematically into the relations of things in the physical, biological, or social world, to seek verification, and to regard all propositions and doctrines as hypotheses with varying degrees of explanatory value and always subject to modification in the light of new information? Available evidence suggests that a very great deal can be accomplished along this line, but that the degree of success depends less on the subject-matter taught than on the manner in which it is taught. The mere teaching of "science" by rote memorization is not likely to produce a scientific attitude. The important thing is that the students be stimulated to ask questions and to seek answers by observation and experiment, learning and using in this connection important theories, observations, and techniques available in the world's vast scientific heritage.

Similar observations apply to the possibility of developing by education and training a "technological attitude" and an innovative disposition -- that is, a practical problem-solving approach, an unwillingness to rest content with traditional ways of doing things, a continual search for better ways of attaining desired goals, and a readiness to test out and adopt promising new methods. Again, not merely learning about modern technologies (physical, biological, and social) is important, but the spirit and methods of the teaching and learning.

The situation is analogous with respect to other personality traits that are important in nearly all occupations -- readiness to cooperate with others, integrity, honesty, and reliability. Direct teaching about these things may to some extent produce the desired results, but much more influence is likely to come from the examples and precepts of the culture in which the youngster grows up and from opportunities that may be offered in the school setting to practice cooperation with others and to take responsibilities in group projects, school activities, and student self-government.

There is some evidence that developmental effects significant for a whole national economy can be attained through educational programs that influence personality traits. The best known case where such results have been claimed is that of the Danish Folk High Schools. As summarized by P. G. H. Hopkins in a paper on "The Role of Adult Education in Economic Development" (In Jackson, ed., 1965):

> "Nobody can estimate exactly what contribution to the Danish economy was made by the Danish Folk High Schools; but all who have studied these adult education colleges and have seen them in action are agreed that they revolutionalized the Danish rural scene. In rapid succession in the mid-nineteenth century Denmark lost land and national prestige in the wars against Prussia and then grain markets and prosperity as the New World prairies were opened up and the Atlantic freight rates were slashed. Yet in this

> period the Danish residential colleges were started and thrived and the Danish peasant, who had been described as 'unprogressive, sullen, suspicious, averse to experiment and incapable of associated enterprise' became 'forward-looking, cheerful, scientifically minded, resourceful and cooperative.' A Danish Education Inspector remarked in the early days how quickly the young men and women learned: he was impressed not so much by the knowledge they have acquired as by the fact that 'they leave the schools different people, having learned to hear, to see, to think and to use their powers.' These became the young peasant farmers who, within a generation, transformed Danish agriculture into the most efficient butter and bacon producing economy in the world. 'The peasant helped himself. He adapted his methods to the new circumstances . . . He was open to the new ideas and willing to apply them. The mobility, the capacity and the culture that such a radical change calls for, when it is to be made by voluntary effort, the Danish peasantry then possessed; and this fact is certainly due to the influence of the Danish Folk High School.' (Hans Lund.)"

DESIRED QUALIFICATIONS FOR OCCUPATIONAL GROUPS

For each of the activities groups outlined earlier (Figure 2-1), beginning with those considered most urgently in need of attention in the country concerned, planners of OET will be well advised to make a systematic analysis of desirable qualifications. The aid of specialists in the various fields of activity will have to be enlisted for this purpose. The checklists given above under the headings "skills," "knowledge," and "personality traits" will be useful as starting points for putting questions to the specialists. In addition to the advice of locally available specialists, international experience can be drawn upon in various ways.

This process of specifying the "end products" which, ideally, the OET system should produce, provides a standard by which to appraise and improve the instructional programs in the school system and in extra-school education and training activities, from the viewpoint of their relevance and effectiveness in meeting the country's needs for qualified personnel.

The process may be visualized and its progress recorded by setting up worksheets on the pattern illustrated in Figure 2-2. Across the top of the worksheet the various types of skills, knowledge, and personality traits are arrayed. (Special classifications and subclassifications can be added to any desired degree of detail.) Down the left side are the types and subtypes of qualified personnel required for the activity group under examination -- again, to any desired degree of detail.

Figure 2-2

DESIRED QUALIFICATIONS FOR
OCCUPATIONAL CATEGORIES

---- INDUSTRY

	SKILLS								KNOWLEDGE											PERSONALITY TRAITS						
	Communication	Computation	Mechanical	Human relations	Analytical	Synthetic	Learning	Specific to occupation	General	Scientific	a. Physical	b. Biological	c. Social	Technological	a. Physical	b. Biological	c. Social	Humanistic	Specific to occupation	Intelligence	Achievement motivation	Scientific-technological attitudes	Innovative	Integrity, honesty, reliability	Readiness to cooperate with others	Specific to occupation
1. Innovative organizers - entrepreneurs a. Public sector b. Private sector																										
2. Managers a. Top and middle level managers in large organizations b. Managers of independent small enterprises																										
3. Submanagers - supervisors and foremen a. Production and maintenance work b. Office and commercial work																										
4. Professionals a. Technologists - engineers (1) Physical science based (2) Biological science based (3) Social science based b. Research scientists (1) Physical science based (2) Biological science based (3) Social science based																										
5. Subprofessionals - technicians a. Physical science based b. Biological science based c. Social science based																										
6. Broadly-skilled workers - craftsmen a. Production and maintenance work b. Office and commercial work																										
7. Specific-skilled workers - operatives a. Production and maintenance work b. Office and commercial work																										
8. Unskilled workers - but not entirely unqualified																										
9. Special combinations of the foregoing																										

The task of the planner, aided by experts, and where possible by actual field studies or reports of such studies, is to assemble information that will enable him and his co-workers to make valid judgments for each important occupational group and subgroup about the skills, knowledge, and personality traits that are essential or desirable. In terms of the worksheet, this means filling each of the boxes created by the intersections of the vertical columns and the horizontal rows with a well-considered judgment. These judgments can be recorded in terms of symbols which indicate not only whether a particular kind of skill, knowledge, or personality trait is needed but also something about the desirable level of attainment in it and the degree of importance to be attached to it in the particular occupation or job. (An example will be given later; see Figure 2-3 below.) In practice, of course, such a worksheet would mainly serve the purpose of raising the appropriate questions. The answers, and the evidence on which the answers are based, would no doubt be embodied in many separate reports prepared by, for example, an expert commission on the curriculum for engineering schools, a study team on improvements in management education and training, a working group on the education and training of science teachers, a committee on development of health personnel, a planning body for improving the training of public administrators, a conference on personnel needs in commerce and finance, and an advisory panel on education for homemaking and parenthood.

Example: Industry's Needs for Qualified Personnel

To illustrate, let us look briefly at the kinds of qualified personnel needed for development of modern industry (Figure 2-2).

Personnel needs for industrialization start with innovative organizers. This holds regardless of a country's ideology or the particular mixture of "socialist" and "private enterprise" elements in its economy. Therefore, the innovative organizer or entrepreneur heads the list in Figure 2-2. His is a key function in industrial development. He brings together combinations of productive factors, launches new products, cultivates new markets, and introduces new technology (in the physical or biological technology of production and also in social technology, such as methods of organization and management).

Next to the innovative organizer in strategic importance and, indeed, essential for bringing his initiatives into effect, are suitably qualified managers and submanagers, together with associated professionals and subprofessionals. The first five groups in Figure 2-2, especially the first two, supply what might be called "the organizing factors" in industrialization. They are the leaders in development; they give concrete shape and execution to ideas that would otherwise remain mere dreams. Without reasonably adequate personnel to perform these functions, industrialization cannot go forward satisfactorily no matter how many skilled workers the education and training system turns out. If there are competent people to handle these organizing functions they will create jobs and they will initiate training programs to overcome shortages that may develop in the supply of other sorts of qualified manpower. Highest priority, therefore, in a program of education and training for industrialization should go to preparing and improving the qualifications of persons who will be competent to perform well as innovative organizers (entrepreneurs), managers and submanagers, and in certain closely related professional and subprofessional roles.

Professionals and subprofessionals in technological and research occupations have been subclassified in Figure 2-2 as "physical science based," "biological science based," or "social science based," according to the educational area of major importance in laying the foundation for their subsequent specific training and work. In the industrial occupations for which physical sciences would be most important are, of course, the electrical, mechanical, chemical, and other engineers and the industrial researchers in physical sciences and their applications. Social science foundations are especially needed for such social technologists in industry as marketing analysts, legal advisers, personnel administrators, and designers of training programs, as well as any others concerned with organization and management.

Broadly skilled workers (craftsmen) are those capable of performing well a considerable range of tasks, while specific-skilled workers (operatives) are trained only for one or a few comparatively narrow jobs, like running a certain machine or handling certain types of sales orders. Training programs for craftsmen must be considerably longer than for operatives, but both should have, if at all feasible, a good general and preoccupational education as a basis for their specific training and to give them more versatility and adaptability.

Thus far the discussion about analyzing desirable qualifications for various kinds of jobs has been at the "macro" level -- illustrating the kind of analysis pertinent to preparing an OET plan of national or other broad scope. But it is vital to the success of OET programs to bring the planning, and its execution, down to the "micro" level. In each locality and each employing establishment some agency and some designated person should be responsible for continually reviewing OET needs and programs, developing plans for improvement, and pushing the plans into effective implementation. The responsible agencies and individuals should, ideally, serve as communication links and organizers of joint planning and cooperation among the local education authorities, employing establishments in the area, special training centers, organizations of employers and of workers, and any other institutions able to aid in OET programs. Analysis of local needs and of individual establishment needs for qualified personnel -- in terms of the kinds of qualities desired (skills, knowledge, personality traits) as well as numbers -- is essential in constructing realistic programs.

A good illustration of detailed, micro-level OET planning within an industrial establishment is afforded by a pilot experiment under way in the Colombian textile firm "Coltejer" at Medellin. In 1966, Colombia's National Apprenticeship Service (SENA), after studying in what fields and in what manner it could best help the country's enterprises to improve their training activities, agreed on a joint experiment with Coltejer. The International Labor Organization (ILO) provided two experts to give advice and assistance. In October, 1967, CINTERFOR -- the Latin American affiliate of the ILO whose full title may be translated as Inter-American Center for Research and Documentation on Occupational Education and Training -- sponsored an international seminar at Medellin on "Promocion profesional"[3] ("occupational advancement") at which progress in the Coltejer experiment was reported. Documents submitted to that seminar showed the methods of analysis that were being used to reveal avenues of advancement within the firm, to specify the requirements of every job, and on this basis to design technical training programs and complementary programs of further general education which would prepare workers to advance to successively higher posts. Figure 2-3 is one of the many detailed charts prepared in the course of the Coltejer analysis (here slightly condensed). It illustrates in a very concrete way the points made in this chapter about (1) analyzing the kinds and degrees of skills, knowledge, and personality traits needed in various occupations and jobs, and (2) carrying this analysis all the way down to the local and establishment level as a basis for detailed planning of OET programs.

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[3] The notion of "Promocion profesional" has become a favorite theme and program aim of SENA under the leadership of Rodolfo Martinez Tono, SENA's National Director. It carries strong overtones of upward social mobility, along with advancement in the occupational sense. Director Martinez says, "By this means, workers in all economic sectors will be able to progress from the position of skilled operative to that of highly skilled, to middle-level technician, to high-level technician, and to production engineer or enterprise manager." (SENA 1967:6).

Figure 2-3

SENA Occupational Advancement
Department of Training within the Enterprise
Section of Antioquia
ILO Advisory Work

KINDS AND LEVELS OF QUALIFICATIONS REQUIRED IN WORK POSTS

(Comparative Table)

LINES OF ADVANCEMENT
Department: Looms
Firm: Coltejer

LEVEL (QUALIFICATIONS)	
A	Prepares projects and plans
B	Administers projects
C	Executes or directs projects
INTENSITY (QUALIFICATIONS)	
1	Minimum - some problems
2	Medium - Normal, general problems
3	Maximum - Above normal, all problems

QUALIFICATIONS AND LEVELS

WORK POSTS		TEXTILE TECHNOLOGY & ORGANIZATION												
Key	Job Title	Evaluating efficiency	Charts & calculations of tolerances	Analyzing studies of yarn breakage	Causes of cloth defects	Quality of yarn	Interpreting inspection reports	Textile laboratory	Work planning	Environmental conditions	Allocation of equipment	Interpretation of work study	Production programming	Production studies
4199	General chief, looms	B3	A2	B2	B2	B3	B2	C2	A3	B3	B3	A2	A2	A2
4190	Chief loom technician	B3	B2	B2	B2	B3	B2	C2	A2	B2	B3	B3	A2	A2
4187	Technical assistant, looms	C2	C2	C2	C2	C2	C2	—	A2	B2	B2	C2	—	—
4188	Technical supervisor	C2	—	C2	C2	C2	C2	—	A1	B1	C2	—	—	—
4168	Mechanic, major repairs	C2	—	—	C2	—	—	—	A1	—	C2	—	—	—

WORK POSTS		MECH. & MAINT.						
Key	Job Title	Mechanism of looms	Reconditioning of looms	Setting up of looms	Adjustment of looms	Maintenance of machinery and tools	Lubricants	Textile design
4199	General chief, looms	B2	B2	B2	B2	B2	B2	B2
4190	Chief loom technician	A3	A3	A3	A3	A2	B3	A2
4187	Technical assistant, looms	B3	B3	A2	B3	B2	B1	—
4188	Technical supervisor	B2	C3	B2	C2	B2	B1	—
4168	Mechanic, major repairs	C3	C3	B2	C2	B1	B1	—

WORK POSTS		PERSONNEL ADM.											
Key	Job Title	Management of meetings	Relations among employees	Orders and instructions	Analysis of shop operations	Individual behavior	Solution of human problems	Merit ratings	Policy on salaries and promotion	Allocation of work loads	Training	Labor policy	Company regulations
4199	General chief, looms	A2	A2	A2	A3	A2	A2	A3	A2	A3	A2	A2	A2
4190	Chief loom technician	B2	B2	A2	A2	A2	B2	A2	B2	A2	A2	B2	B2
4187	Technical assistant, looms	—	C2	A2	B2	B2	B2	B2	C2	A2	B2	C2	C2
4188	Technical supervisor	—	C2	A2	C2	B2	B2	—	C2	A2	B2	C2	C2
4168	Mechanic, major repairs	—	C2	A2	C2	C1	C1	—	—	A1	C2	—	C2

WORK POSTS		SAFETY					GENL. ADM.				
Key	Job Title	Loom safety norms	Reports and record of accidents	Analysis of accidents	First aid	Use of safety devices	Structure of the enterprise and its organization	Reports (oral, written, charts)	Management of production budgets	Cost study and control	Standards costs
4199	General chief, looms	B2	B2	B2	B2	B2	B2	A3	A2	A2	A2
4190	Chief loom technician	B2	B1	B2	B2	B2	B2	A2	B2	B2	—
4187	Technical assistant, looms	B2	B1	B1	B2	B2	C2	B2	—	B1	—
4188	Technical supervisor	B2	B1	C2	B2	B2	C2	B2	—	—	—
4168	Mechanic, major repairs	B2	—	—	—	B2	—	B1	—	—	—

WORK POSTS		PERSONAL QUALITIES								
Key	Job Title	Intelligence	Will	Emotionality	Honesty	Authority	Sociability	Sense of responsibility	Mental strength	Physical strength
4199	General chief, looms	2	2	3	3	3	3	2	3	1
4190	Chief loom technician	2	2	3	2	3	3	3	2	2
4187	Technical assistant, looms	2	2	2	2	3	2	3	2	2
4188	Technical supervisor	2	2	2	2	3	2	2	2	2
4168	Mechanic, major repairs	2	2	2	2	3	2	3	2	2

SOURCE: SENA 1967: Annexo No. 1

Example: Agriculture and Rural Development

Turning now to qualified personnel needs for agriculture and rural development, Figure 2-4 lists the most relevant occupational groups. Experts in this field will be able to improve this list by making it more concrete and comprehensive, perhaps analyzing personnel needs in terms of kinds of crops and environmental conditions in specific regions. As mentioned earlier, the needs of agriculture and rural development have been relatively neglected in studies on human resources development and manpower planning; much less analytical work is available than in the case of industry on which to rest such a classification. This one will serve, however, for illustrative purposes.

Figure 2-4

QUALIFIED PERSONNEL NEEDED FOR AGRICULTURAL AND RURAL DEVELOPMENT

1. Farmers and farm homemakers

    1.1 Farm operators
        1.11 Independent owner-managers
        1.12 Tenant and renting farmers
        1.13 Large plantation managers and submanagers
        1.14 Other special types

    1.2 Farm workers
        1.21 Family
        1.22 Non-Family

    1.3 Farm wives, homemakers

2. Suppliers of farm needs, marketers and processors of farm products

    2.1 Suppliers of seeds, fertilizers, pesticides, implements

    2.2 Suppliers of contract services (well-boring, use of tractors and other equipment, etc.)

    2.3 Suppliers of agricultural credit

    2.4 Marketers engaged in buying, storing, and shipping farm products and selling them in outside markets

    2.5 Processors of farm products (grain millers, sugar extractors, fruit and vegetable canners, etc.) (Qualified personnel needs here become those of industry as operations become larger and more sophisticated.)

3. Suppliers of advisory services, education, research

- 3.1 Agricultural extension and rural community development workers
  - 3.11 General purpose, village-level advisors and promoters
  - 3.12 Specialists to back up the foregoing (crop production, livestock, farm management, rural home improvement, health and family planning, etc.)
  - 3.13 Specially trained village leaders, "*animateurs*"
  - 3.14 Administrators of agricultural and rural development agencies

- 3.2 Teachers and educational administrators
  - 3.21 For rural schools. (Especially important: teachers and administrators capable of creating community schools, serving adults as well as children, linked closely to agricultural extension and development programs, in villages and in moderate-sized towns of rural areas.)
  - 3.22 For agriculture-oriented instruction at secondary and higher levels

- 3.3 Agricultural research personnel

NOTE: Most of the occupational roles outlined above may be performed under various organizational forms, by

- (a) independent enterprisers and their family members or employees, or
- (b) managers and other employees of cooperatives, or
- (c) managers and other employees of government establishments.

Whatever the organizational system, there will be considerable similarity in the skills, knowledge, and personality traits desired for qualified personnel. But there will also be some differences.

Each occupational subgroup (including, of course, more detailed subdivisions than are shown here) should be analyzed to determine the skills, knowledge, and personality traits that are essential or desirable.

A major concern of agricultural development in newly developing countries is to promote the transformation from traditional to modern agriculture. Traditional agriculture is in large part subsistence, self-sufficient farming. But the more agriculture modernizes, the more it ties in with the economy of adjacent urban areas, of the nation, and even of foreign countries. Many of the personnel needs for modern or modernizing agriculture are off the farm. Just as essential to efficient modern farming as the tiller of the soil himself are the suppliers of necessary inputs, such as fertilizers, seeds, insecticides, and implements, and the marketers and processers of farm products. An education and training program to aid in the modernization of agriculture, therefore, must be directed not only at agriculturalists in the narrow sense but also at personnel for agriculture-related industries and services in the villages, towns, and cities.

Extending the Analysis to a Wide Range of Occupations

Other groups of activities requiring qualified personnel for development, in addition to industry and agriculture, need to be analyzed in a similar fashion -- for example, education, government and politics, health, homemaking, and the others listed in Figure 2-1. Each will obviously require a somewhat different approach. The sum of all these analyses should be a better qualitative, and not merely quantitative, understanding of the education and training problem.

This advice to analyze the desired qualifications for the very many different types of occupations that are important in development may seem to be a counsel of perfection, and in a sense it is. Yet the appraisals and rethinking that would thereby be stimulated are likely to prove highly rewarding, and there are a number of considerations that make the undertaking less formidable than might appear at first.

Not everything need be done at once. The most urgent needs are limited in number; a selective approach is indicated. A start can be made with the occupational groups that are most important developmentally in the country's circumstances, and successive studies on other groups can be added over the years.

Furthermore, there is overlapping and interchangeability in the requirements for different occupations, so that the coverage of the analysis can be multiplied rapidly once a limited number of initial studies have been made. In this connection, the identification of "clusters" of occupations which have a good many requirements in common will be very helpful to educational planners concerned with curriculum development.

Finally, much detailed work relevant to this type of analysis has already been done at various places in the world. The results can often be adapted to local circumstances with less effort than would be required to start from scratch. Educational institutions, various kinds of specialized training schools, and the training officers of employing organizations in many countries have been grappling for a long time with similar problems. Some of the results have been written down in reports or in institutional programs and syllabi which, with appropriate adaptation, can be useful in other countries. Much pertinent experience is in the minds of a great variety of occupational specialists and educators, available mainly through the use of well selected consultants. The international aid agencies concerned with human resources development, education, and training for various kinds of developmental activities could perform a useful service by giving more attention to the assembly, analysis, and dissemination of this kind of information.

SOME PRACTICAL CONCLUSIONS

The analysis of this chapter suggests a number of practical conclusions which will be briefly presented.

1. Occupational education and training programs to foster development should be planned with reference to the priority needs of the employment system, not simply adopted haphazardly and piecemeal.

2. Highest priority should be given to programs which raise the quality and (to the extent necessary) the quantity of qualified personnel required in "multiplier occupations" -- for example, innovative organizers (entrepreneurs), managers and submanagers, and selected types of professionals and subprofessionals, including teachers. These are the people who must create new enterprises and new jobs, establish essential governmental, educational, industrial, and other infrastructures, and provide for education and training to meet the country's needs for qualified personnel.

3. In order to obtain a suitably balanced output of persons qualified for different occupational roles, there should be: (a) continuous study of the changing requirements of the developing country, and (b) close linkages between the employment system on the one hand and the education and training system on the other, so that there is immediate feedback to correct errors in forecasts of requirements.

4. In planning the content of education and training that will best prepare for different occupational roles, it is useful to think in terms of a matrix or cross-tabulation in the form of Figure 2-1. Analysis of this sort will probably reveal that there are numerous common items of skill, knowledge, and personality traits which are desirable in some degree for practically all occupations. Other requirements are shared by fairly broad groups of occupations. Finally, there are highly specific requirements for particular occupations and even for particular jobs within a given occupation.

5. The foregoing point makes it desirable that an education and training system should be so planned as to impart:

(a) to everybody, as much as possible of the skills, knowledge, and personality traits which are broadly applicable to a wide range of occupations and jobs,

(b) to those looking toward a certain range of occupations, the additional skills, knowledge, and personality traits considered especially important for such occupations,

(c) to those definitely committed to a particular occupation, still more sharply focused preparation, and

(d) finally, at the point of commitment to a specific job, the specific training to meet its special requirements.

6. Because of the rapid changes in occupational requirements induced by progressive technology and by changing economic, political, and social environments, the concept of an "occupation" as a well-defined and stable entity is becoming less applicable. It is, therefore, important to educate for basic skills, knowledge, and personality traits that are broadly applicable, so as to enable individuals to learn specific jobs quickly and to be in a position to learn new techniques or to shift to new jobs by retraining when necessary. A person who has this basic preparation may still lack the more specific skills required for a particular job. But he is a trainable person.

In the following chapter, we shall consider how an occupational education and training system might be designed so as to give effect to these principles.

CHAPTER 3

CURRICULUM DESIGN

The next logical step, once the OET planner has a fairly clear idea of the kinds of qualifications (skills, knowledge, and personality traits) required in some of the occupational roles that deserve high priority in the country's development program, is to consider how to produce these qualifications most effectively and efficiently. The institutional and organizational problems will be treated in subsequent chapters. This chapter will focus on problems of content -- what sorts of things need to be taught and learned in the various phases of occupational preparation, and how to determine (and redetermine from time to time) the substantive aims of particular education or training programs, courses, and guided experiences.

SOME CONCEPTS AND PRINCIPLES

The Super-Curriculum

In the language of educators, our topic is the curriculum. But the term curriculum is usually associated with formal education in schools, while our concern for occupational preparation must have a much broader scope. OET goes forward not only in the regular education system (the school system), but -- equally important, and in some respects more important for OET purposes -- in extra-school instructional and learning situations. These extra-school OET activities are numerous, represent in the aggregate very large totals of investment and of learning-hours in countries where OET is most effective, and are by no means to be neglected (as is too often the case) in designing or redesigning an OET system.

It will be useful to introduce here a concept that we shall call "the super-curriculum." This refers to the entirety of all the learning opportunities of a lifetime. The super-curriculum thus comprehends every learning situation, informal as well as formal, which an individual is exposed to as an infant and child in the family, in school (at whatever level, from primary through higher education and in adult or special schools), in work experiences and formal or informal training programs connected therewith, possibly in military service and associated training, in contact with agricultural extension workers or advisers and consultants in other fields of activity, as a reader of newspapers, magazines and books, listener to radio or watcher of TV, and as a participant in trade unions, trade associations, professional societies, conventions, conferences, technical seminars, and other formal or informal groups. Not all of these learning situations can be influenced by planners concerned with producing better qualified personnel for developmentally important occupations. But many of them can be. All should be considered.

In devising ways to prepare people for better performance in occupations, the planner should think, of course, of the school system, but beyond that he should give equal (or perhaps greater) attention to other channels, starting with those of the employment system itself. Curriculum construction and reconstruction, therefore, should proceed not only in terms of the curricula of various types of schools but also of the multifarious possibilities of extra-school curricula.

This pluralistic approach which seeks all possible channels into the super-curriculum is important to newly developing countries for several reasons:

1. The school system is already heavily burdened, usually overstrained.

2. For the sake of rapid progress, it is highly desirable to improve the occupational performance of persons already in employment, not to rely entirely on improvement in the generation coming up. Extra-school OET, therefore, deserves emphasis.

3. Managers, administrators, innovative organizers, entrepreneurs, and their associates who perform crucial roles as "organizing factors" are particularly significant for a country's development. But it is next to impossible to determine far in advance who is going to fill these roles and then train the predestined individuals ahead of time in the exact skills and knowledge they will need. The better solution is to provide opportunities for supplementing their previous education and training after the true direction of their careers has become manifest and special motivation has developed. This argues for a great variety of in-service, mid-career, formal and informal programs.

4. There are many strong arguments (some will be discussed later) for postponing very specific job training until actual commitment to a particular job. Such training or retraining during employment, or immediately prior to employment, will often require extra-school arrangements, though it may be carried on partly with the cooperation of the school system.

Desired Qualifications versus Standard Subjects

The approach to curriculum design recommended here is functional. That is, the content of education and training should be based on analysis of the skills, knowledge, and personality traits which it is desired to produce in those who experience the particular program. Such analysis of desired qualifications will often clash with another way of constructing a curriculum, which is to ask, "What are the standard subjects that usually are taught to budding physicians, or engineers, or machinists or electricians, or farmers?" In fact, one of the purposes of a functional analysis is to stimulate rethinking of conventional wisdom about what is essential or right and proper. Much of the curricular content in professional schools and technical or vocational programs, not to speak of general education programs, is based on little more than copying of a prestigious program from somewhere else (often as of half a generation ago, when the curriculum designers had their education and training). Around the world there are many situations where curriculum overhaul is badly needed.

The process of designing and redesigning curriculum content for OET is -- or rather, should be -- a continuous one. Occupations are not static in a modern or modernizing country. New occupations are continually arising, the content of old ones is likely to be changing, and some time-honored occupations are going out of existence. In fact, one may challenge the relevance in modern conditions of the very concept of "an occupation," if one means by that something like the traditional crafts of pre-industrial societies. In the old days, youngsters learned the "secrets" of a trade by long apprenticeship, practiced them for a working lifetime, and passed them on to the next generation. The appropriate concept of "an occupation" nowadays is something much more amorphous and shifting, a cluster of functions and tasks that are commonly, for the time being at any rate, grouped together for performance by persons supposed to have certain kinds of qualifications. Consequently, the appropriate content of education and training for a given occupation is not to be thought of as something fixed and standardized.

Some useful procedures have been developed for functional analysis on which to base trade training programs. For example, the research staff of INACAP, a Chilean government-supported occupational training organization (see Chapter 5), has studied the kinds of tools, mathematical operations, etc. actually used by workers in various trades. How frequently does the ordinary electrician use a saw? A drill? A micrometer? Calculations involving square roots? Results are taken into account in redesigning courses, to achieve better work competence in less time.

A more elaborate study of the same general type was focused on the occupation of aviation mechanic in the United States (Allen et al.: 1966). Large amounts of data were gathered nationwide from aircraft repair and maintenance shops and analyzed to determine the frequency and also the relative importance for aircraft safety of the special tasks performed by aviation mechanics. This led to revisions in training syllabi. For example, training courses and licensing examinations still required aviation mechanics to acquire proficiency in working with wood and canvas (because early planes had these materials), but there was, and still is, no reason for these particular skills in dealing with today's planes made entirely of metal.

Community Linkage -- For Analysis, Feedback, and Revision

A deficiency in the development programs of many countries is inadequate linkage between the education system on the one hand and the employment system on the other. Sometimes there is little communication -- perhaps none on a systematic basis -- between those who design curricula and potential employers or experienced practitioners who can provide realistic information on what content is most valuable and least valuable. Organizational means for improving such linkage will be considered later. For the present, it is important to stress the need to get community participation -- especially from employers and workers -- in analyzing and criticizing the content of OET programs.

Once a program is launched, there should be systematic follow-up of graduates to learn how relevant and effective their instruction has proved to be in their jobs and to get suggestions for improvement. Similar information should be sought from employers and from experts in the specialties involved. Objective measurements of performance, where obtainable, should be analyzed and compared with performance by persons prepared for their jobs by other methods. All these various provisions for "feedback" should stimulate and guide successive revisions of curriculum content and methods of instruction.

The Common-Core Principle

Analysis of the skills, knowledge, and personality traits wanted in large numbers of different occupations inevitably reveals many elements common to large groups of occupations or even to all occupations or nearly all. This is particularly true of the kinds of things that we think of as belonging in general education: ability to read and write, elementary computation, etc. Personality traits like honesty and reliability and readiness to cooperate with others fall in the same category. The fact that some requirements are common to all or many occupations makes it possible for a properly designed curriculum of general education to serve as a solid foundation for a wide variety of later occupational specializations.

The common-core principle can also be applied to more limited ranges of occupations, sometimes with important advantages in effectiveness and economy of instructional programs. For example, a study was made at the University of Illinois in 1965 to determine the appropriate curricular content for training specialized types of technicians (Schill and Arnold: 1965). A sample of approximately 350 technicians from Illinois manufacturing industry was selected for interviews, and interviews were also carried out with supervisors and other knowledgeable management personnel. Technicians were classified into six groups: mechanical, electronic, chemical, electro-mechanical, electro-chemical, and chemical-mechanical. On the basis of analysis of courses typically offered for the preparation of such technicians in technical institutes, and after consultation with experts, nearly 100 items of possible course content were selected and typed on separate cards. For example:

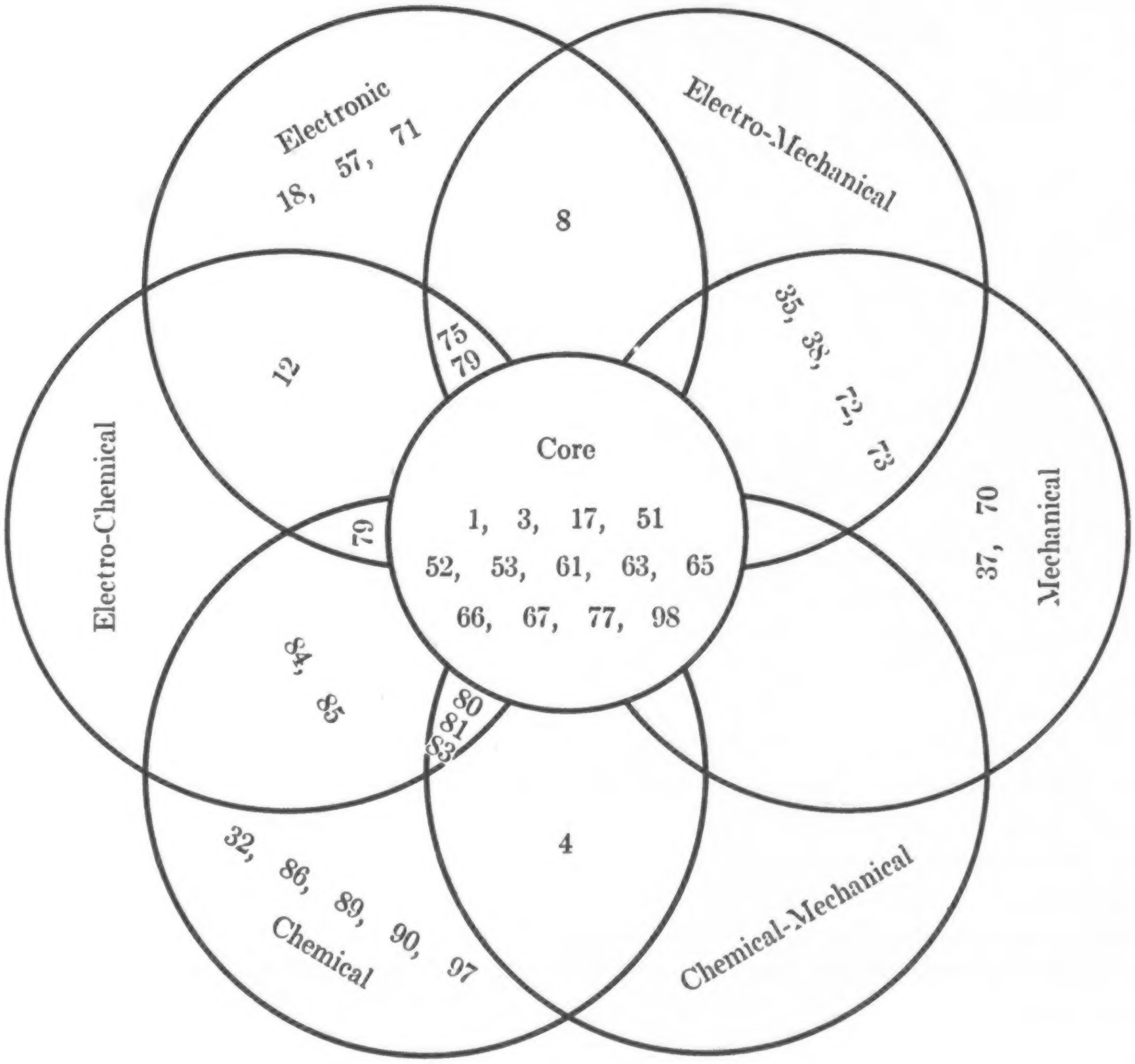
> "(1) Technical and scientific oral and written communication including business forms, reports, emphasizing the different types of business letters. Techniques of collecting and presenting scientific data. Informal reports and formal reports; special types of technical papers.
>
> "(2) Fundamental physical and chemical principles governing food preservation by freezing, canning, drying, concentration, salting, smoking, fermenting, carbonating.
>
> "(11) The constellations, solar system, structure of the universe, determination of time, and calendars. Use of astronomical instruments for data collection.
>
> "(37) Metal forming including casting, die casting, forging, extruding and the accompanying pattern and tool construction.
>
> "(57) Vacuum tube and transistor theory. AC parameters, resonance, transformer coupling, filters, bandpass, and complex wave forms. Tuned and untuned circuits, and vacuum tube power supplies."

Technicians, supervisors, and managers were then asked to give their judgments on the appropriateness of each item for the training of each of the various types of technicians by sorting the cards into three piles indicating respectively: (1) closely related to job performance, (2) somewhat related, (3) totally unrelated. From analysis of these results, recommendations were reached on the content thought to be desirable in preparation for each of the six specialized technician occupations.

Figure 3-1 summarizes the findings. Each number represents one of the proposed curricular items, and the overlapping of the circles shows which items were unique to a particular technology and which were common to two or more. The analysis reveals a very substantial common core. The numbers in the central circle, common to all six technologies, refer to such things as technical and scientific oral and written communication,

Figure 3-1

SCHEMATIC REPRESENTATION OF GENERAL AND
SPECIFIC KNOWLEDGE RELATED TO
SIX TECHNOLOGIES


Electronic
18, 57, 71
8
Electro-Mechanical
12
75
79
35, 38, 72, 73
Electro-Chemical
Core
1, 3, 17, 51
52, 53, 61, 63, 65
66, 67, 77, 98
37, 70
Mechanical
79
84, 85
80
81
83
4
32, 86, 89, 90, 97
Chemical
Chemical-Mechanical

SOURCE: Schill and Arnold 1965:83

data processing and interpretation of engineering drawings, use of test equipment, trigonometic functions and logarithms, algebra, sketching forms from observation, machine elements and calculations in determining the size and shape of machine parts, preparation of schematics and layouts using standard conventions, and environmental testing of components, parts, and products for assessment of performance in actual applications. By contrast, included in the "electronic" circle but not in any other are such requirements as principles of pulse and timing circuits, vacuum tube and transistor theory, and electronic circuit theory of video amplifiers, tuned amplifiers, and basic feedback oscillators.

The Cluster Concept

A related concept which is useful in curriculum design for OET is that of families or "clusters" of occupations.

Should youngsters in secondary school be prepared to a high level of skill for employment in a specific occupation, or should they be given broad programs which have some relevance to a great variety of occupations but do not carry them very far toward job-entry requirements of any one? The cluster concept offers a middle ground. By this approach the individual is prepared to enter a family of occupations rather than a specific occupation. He does not develop a deep and thorough competence in any one, but acquires job-entry skills and basic knowledge common to a number of related occupations.

A research team at the University of Maryland under the direction of Donald Maley has explored this concept and its applicability in considerable detail. They tested the idea against reactions obtained in interviews with personnel managers, training directors, school superintendents, industrial education supervisors, and labor union officers. The general reaction of those interviewed was that (1) students from a "cluster" program would be excellent potential employees and would be less difficult to train because of their broad, fundamental background, and (2) the concept was feasible and could be implemented in secondary schools with little difficulty (Maley 1966 Phase 1:18-34). Then they proceeded to develop a set of sample cluster-type instructional programs, selecting from available techniques and evolving some new techniques as they went along to identify the requirements of various occupations, to group the occupations into appropriate clusters sharing important common requirements, to select occupations within each cluster for the detailed analysis of tasks for which students should be prepared, and, finally, to analyze these tasks into educational requirements and write proposed programs and syllabi for students and for teacher training.

The final report on the project describes these procedures (Maley 1966). It also includes a brief review of related studies and of related school programs. Three course outlines are presented, together with the detailed analytical processes by which they were worked out. These cover the following clusters, including the specific occupations selected for special study within each cluster, as shown:

I. Electro-Mechanical Installation and Repair
    1. Business machine serviceman
    2. Home appliance serviceman
    3. Radio and television serviceman
    4. Air conditioning and refrigeration serviceman

II. Metal Forming and Fabrication
    1. Welder
    2. Machinist
    3. Sheet Metal Worker
    4. Assembler

III. Construction
    1. Carpenter
    2. Mason
    3. Plumber
    4. Electrician
    5. Painter

In selecting the specific occupations for attention within each cluster five criteria were used. The occupation should have:

1. A favorable employment outlook. Example: Machinist, included -- thousands of job openings. Electroplater, not included -- only a few hundred job openings.

2. The instructional capability of being implemented in a secondary school program. Example: Carpenter, included -- physically capable of being taught in a school. Excavator, not included -- physically incapable of being taught in a school.

3. Opportunity for entry upon graduation from secondary school. Example: Machinist, included — high school graduate may enter. Layout man, not included -- requires experience as a machinist.

4. Numerous skills and knowledge, providing commonalities with other occupations. Example: Mason, included -- involves use of many skills and knowledge. Hod carrier, not included -- requires little skill or knowledge.

5. Opportunity for advancement through further schooling, apprentice programs, or on-the-job training. Example: Electrician, included -- apprenticeship program available. Construction laborer, not included -- no further training necessary.

The research group emphasized in its report (with numerous supporting quotations from the literature of education, labor, economics, and industry) that there is a real need for the flexibility and adaptability that can be brought to occupational education through the cluster concept, for four reasons: (1) Students need to be provided with a greater degree of mobility on a geographical basis; many will migrate to other localities. Their adjustments will be facilitated by clusters of competencies. (2) They will also need mobility among jobs within an industry or occupation. The rate of job shifts is high; transferable skills are desirable. (3) Students will need to be able to adapt to technological change. (4) There is need to provide students with greater flexibility in occupational choice patterns. Appropriate initial choices and later decisions in response to opportunities for shifts and advancements will be improved if the student is equipped with skills and knowledge related to families of occupations.

GENERAL EDUCATION AND THE WORLD OF WORK

The balance of this chapter will consider curriculum design for OET in each of the successive phases outlined in Chapter 1, starting with Phase 1, General Education.

General Education, Development, and Occupational Requirements

If one asks, "What are the most significant tasks of education in relation to the development aims of newly developing countries?" the answer must certainly include these two items:

1. Preparing people to initiate, accept, and adjust constructively to the economic, social, and political changes which are both conditions and consequences of modern development.

2. Preparing people to perform effectively the hundreds of occupational roles, many of them new, which are required in modern or modernizing economic, social, and political systems.

The first set of tasks consists essentially in producing new attitudes, outlooks, and motivations. These, in turn, are interwoven with new knowledge and skills; for example, acquiring the ability to read and write can open a world of new impressions and greatly change a person's outlook. The major developmental task of education is, from this standpoint, to liberate minds and broaden perspectives. People need to learn to think in terms of scientific cause and effect rather than fate or magic. They need to learn to cooperate effectively and to be able to trust one another in operating new institutions where loyalties, cooperation, and trustworthiness are essential over a much wider range than in the traditional family, tribal, or village groups.

The second set of tasks, which is the focus of this study, overlaps the first. Attitudes, outlooks, and motivations ("personality traits" in the analysis of Chapter 2) are important ingredients in the qualifications for good performance in modern-type occupations. The question of the extent to which the shaping of attitudes, outlooks, and motivations are feasible tasks for formal education is a puzzling one, as already noted. If one equates _education_ and _schools_ the answer probably has to be a cautious estimate that the schools can do something along this line -- probably more than they are now doing in most countries. But there are attitude-shaping influences in every culture that in many respects are more powerful than the schools -- the family environment, religious influences, and so on. The chances of accomplishing significant changes through education are increased if one widens the concept of educational planning to include _extra-school_ as well as _in-school_ education and thinks not merely of the school curriculum but also of the more inclusive super-curriculum. For example, radio and TV broadcasts by political and cultural leaders and the informational content of the mass media (news, even commercial advertisements) no doubt have important attitude-forming effects. Without going so far as totalitarian control over mass communications, these can be used as important elements in a planned program of education for development. And, as suggested earlier, parent education for adults on modern ideas of child development might be a feasible indirect way of influencing personality traits in the next generation.

Specialization and Rapid Change

Two characteristics of modern development place enormous tasks on education, especially from the viewpoint of occupational preparation.

First, modern development brings an increasing degree of specialization, "technicalization," and complexity into the processes of production and, indeed, into the functioning of nearly all the processes of the economic-social-political system. This necessitates education for more people, a higher average level of education, and also new educational content and methods. Education must emphasize skills, knowledge, and personality traits different from those required in traditional societies. In particular, education must give greater weight than in the past to science (physical, biological, and social), and through its methods of instruction must seek to impart scientific and technological (that is, inquiring and problem-solving) attitudes.

A recent United Nations study observed that the background of children growing up in newly developing countries is "often alien to the attitudes valued in a technological society. Children in an industrialized country nowadays grow up with a considerable background of technical information; in the developing countries lack of such a background presents a serious handicap ..." In the words of the same study, "the level of general education required before technical education can be effective is rising steadily ... By comparison with the industrialized countries, pupils in similar educational institutions of the developing countries tend to begin pure vocational training, or specialization for particular skills, at a much earlier age. The results are unsatisfactory, partly because the technical and vocational schools often have to make good the deficiencies of primary school instruction and partly because the pupils are not old or mature enough" (U.N. 1964, Add. I:45).

A second characteristic of modern development is that it steps up the pace of change in all aspects of life and work. Consequently, education must put greater weight than in the past on preparing people to be adaptable, versatile, and occupationally mobile. In earlier days, said Alfred North Whitehead, "the time-span of important change was considerably longer than that of a single human life. Thus, mankind was trained to adapt itself to fixed conditions. But today this time-span is considerably shorter than that of a human life, and accordingly our training must prepare individuals to face a novelty of conditions" (Whitehead 1931:xix). When change was less rapid, the information and ideas that a person acquired in his youth could serve him fairly well for the rest of his life. He could perform reasonably well as a producer and a citizen without having to learn or unlearn much in his adult years. But in an environment of rapid change, specific skills become obsolete and new ones have to be acquired, and ideas that were right yesterday may be wrong today, or irrelevant.

Both from the individual and the social point of view, this is a powerful argument for providing as much general education as possible and also for making occupational preparation broad-based, with emphasis on understanding and technical versatility.

The first requisite of good occupational preparation to meet the needs of modernization is, therefore, a good system of general education. In practice, shortage of resources rather than some ideal determination will limit the quantity and quality of general education that can be provided by most newly developing countries.

In the poorest countries this limitation is at present very severe. Even the minimum of elementary education required to produce functional and lasting literacy (which educators estimate at about four years of schooling, though highly motivated adults may learn the equivalent in much less time) is still unavailable for a considerable fraction of the rising generation, not to speak of those now in the working ages whose generation was even less well provided with educational opportunity. In the more affluent countries, on the other hand, completion of secondary school is coming to be regarded as a target for nearly everyone, and the standard of common general education is even rising into the college and university level in the United States. For newly developing countries that are making good progress, the reasonable next goal may be a gradually rising quantity and quality of primary education, while carrying an increasing fraction of the relevant age group through secondary school and a necessarily small but well-selected group of the ablest on to higher education. Thus, for a long time to come, people in newly developing countries are unlikely to be in danger of having "too much" general education. The effective limitation will be the amount that the country and the individuals or their families can afford, in view of the other pressing demands on national and family budgets.

Occupational Preparatory Functions of General Education

Of course, general education has to be concerned with healthy development of the individual and growth of his knowledge, skills, and personality in many respects, hopefully making him a better citizen, family member, parent, friend, and a more cultured human being. Its purpose is much broader than to lay the foundation for occupational preparation. At the same time, this latter is one of the tasks of general education and an important one, especially in societies seeking to modernize rapidly. Viewed as a foundation for later occupational learning, general education has three major functions:

1. To provide a core of knowledge, skills, and personality traits that are basically important in most or many occupational roles. This includes the ability to communicate effectively (reading, writing, speaking), to use at least simple mathematics, to have some understanding of the physical, biological, and social environment, and to be able to work productively with others in cooperative projects.

2. To induce learning attitudes and learning skills. "Learning to learn," even more than the specific content of what is learned, is surely to be regarded as the central benefit of general education. It prepares a person to learn specialized knowledge and skills in a minimum of time, to keep up with innovations in his occupation, and to be occupationally mobile when circumstances make it desirable. This function of general education no doubt depends more on the methods of instruction than on the specific content. Emphasis on discovery and application of concepts and principles, rather than rote memorization, and promotion of rational, innovative, problem-solving attitudes bring out the qualities most needed in modernization. Yet too many school programs seem designed to smother these qualities, by stressing memorization rather than investigation and syllabus-bound examinations rather than problem-solving.

3. To provide a general acquaintance with the world of work and with occupational possibilities and requirements. This can be done by

systematically interrelating academic subject matter with information about the world of work, by visits to observe people doing various kinds of jobs, by choice of illustrative problems and exercises, by interviews with and talks from persons in a variety of occupations about their work, and by workshop and laboratory experiences designed to link the abstract formulations of knowledge to the workaday world. To the extent that such an educational policy is implemented, the transition from the general education of Phase 1 to what we are calling in Phase 2 "pre-occupational" education will be gradual.

This point of view on the occupationally related functions of general education is not universally accepted. A considerable variety of attitudes about the proper relation of the school curriculum to the world of work exists among educators. The issues become particularly acute at the secondary school level, but also extend downward into the primary and upward into post-secondary. Among the contrasting attitudes are these: 1) that the task of the schools in intellectual development should not be contaminated by occupational concerns; 2) that general, intellectually oriented education should be provided for one group of students and vocationally oriented education for another, in separate schools; 3) that general education should be provided for all students in unified comprehensive schools, with guided choices among curriculum branches, including vocationally oriented courses, on the basis of aptitude and interest; 4) like the preceding, but with strong efforts to break down the sharp distinctions between "academic" and "vocational" courses, to integrate academic and occupational elements into the main stream of general education, using each to support and reinforce the other. The trend of expert opinion in most countries, and more slowly of practice, seems to be definitely away from position 1) toward the later positions, especially 3), with position 4) inspiring interest but still highly experimental.

Integrating Academic and Occupational Elements

No concept of general education is satisfactory in the modern world which results in a curriculum focused exclusively on the more abstract embodiments of knowledge, leaving out learning experiences derived from practical action and acquaintance with the world of work. Nor is exclusive focus on practical-vocational elements a good education, even from the viewpoint of occupational preparation only, since occupational performance today tends to depend more and more on abstract forms of knowledge (theories), and since the theoretical underpinning aids adaptability and transferability in a world where occupational requirements are constantly shifting.

Furthermore, there are pedagogical reasons, based on the psychology of learning and motivation, for integrating "academic" and "vocational" elements in the general education curriculum. Concern for democratic social policy reinforces this line of thought, since the alternative to such an integrated curriculum may be to fail to retain in the education system large proportions of youngsters whose hereditary characteristics or social environment or both make them less willing or less able to absorb purely abstract, verbal learning.

Thinking along these lines, accompanied by experiments in redesign of curriculum content and instructional methods, is going forward in a number of countries. There is a particularly important movement in the United States, involving a moderate but increasing number of local school systems, assisted and stimulated by agencies which provide funds for research and experimentation, such as the Ford Foundation and the Office of Education in the Federal Department of Health, Education and Welfare.

"Liberal education," says Marvin J. Feldman of The Ford Foundation in a paper on "Making Education Relevant," (Feldman 1966) "is more than an education for gentlemen of leisure ... and should in no way foreclose technical education. An educational program ... should teach youngsters not only how to prepare for better lives, but also for better occupations ... in pursuing this purpose, the two approaches need to be integrated throughout the entire educational experience. The current tendency to give a student initial general education, then specialization, is inappropriate on pedagogical grounds, and is at the root of the major problems in curriculum development. Nor does it fit an educational philosophy which holds that culture and vocation cannot be separated."

Some children, he points out, are less verbally gifted and do not look at things from an abstract point of view. Oftentimes, they can be assisted to learn the content of general education through associating it with the more concrete and manipulative techniques of vocational education. "We need to create in our elementary and secondary schools a coordinated curriculum where vocational and general education reinforce each other ..."

A paper by Robert M. Morgan and David S. Bushnell of the U.S. Office of Education on "Designing an Organic Curriculum" takes a similar line (Morgan and Bushnell 1966). The tendency in the past to separate general and vocational education, they say, has handicapped both those youngsters who are going further up the educational ladder and those who terminate their formal education earlier. "The academically oriented students are directed to those college preparatory programs which will enhance their performance on the college entrance exams. They have little opportunity to acquire a knowledge of the functionings of the business and industrial community," and they "are not at all prepared to cope with the question, 'What happens if I must leave college before graduation?'" On the other hand, students exposed to current vocational programs "find themselves being trained for a narrow range of job skills" and "receive too little opportunity to develop competence in the basic learning skills which they must have if they are to cope adequately with present day society." Experimental efforts in integration of vocational and general education elements into the secondary curriculum are in progress. Richmond, California, and Quincy, Massachusetts, were among the pioneers.

Some of the most fundamental and imaginative rethinking in this field emanated from a large study conference held during six weeks of the summer of 1965 at the Massachusetts Institute of Technology under the leadership of Professor Nathaniel Frank, a physicist. There was substantial agreement among working groups on the following basic issues:

"First, there is need to treat vocational-occupational education as an integral part of the common core of all education....

"Second, current vocational education should be expanded and generalized so that working with materials, with systems and with processes provides a base for intellectual growth along both traditional academic and vocational paths.

"Third, some of the new vocational education should be part of the educational experience of all students and, conversely, some of the classical disciplinary type of education should be part of this experience.

"Fourth, there is need, early in a student's schooling, to replace the traditional division of education into separate disciplines by an educational pattern in which current categories of subjects are not readily identifiable. This should be initiated at the beginning of the junior high school program. Such an operation will use as central facilities shops or working areas such as laboratories and will call for the development of a new kind of cooperative group teaching effort.

"Fifth, the junior high school pattern of experimentally and experientially based education should evolve continuously into a few broad but closely connected avenues of education in senior high school. These should have no terminal educational goals, but ... provide foundations for continuing education whether it be on the job or in formal post high school curricula.

"Sixth, education for vocational competence should build in flexibility and adaptability to produce transferable knowledge and skills...."

The translation of principles such as these into practical programs, the testing of these programs in school systems, subsequent modification and retesting, improvement, expansion, and further trials is a process of curriculum development that has only recently begun. While the new concepts seem promising, and results of some early experiments are encouraging, it will be several years before the value of resulting innovations in school curricula can be appraised with some confidence. This is a field of tremendous potential importance; experimental work and evaluation of results should certainly be pushed with all possible speed consistent with careful work.

The innovative effort should by no means be confined to one country, nor is it likely to be, for countries at various levels of development all around the world are faced with the problem of how best to interrelate or integrate general education and preparation for work.

Solutions devised in affluent and educationally advanced countries like the United States are unlikely to be useful without considerable modification in poorer and educationally less advanced countries. For example, the American experiments in this field use expensively equipped shops and laboratories, and some of the plans call for integrated efforts by teams of instructors, each of whom needs to have a specialized competence in his field (machine shop, mathematics, language, science, etc.) and also a highly professional spirit and competence as a teacher. Can the same basic principles be adapted to situations where equipment expense must be held to a minimum and where the scarcity of qualified professional teachers is acute in nearly all fields and especially in those where the skills involved require that the educational system compete for talent with industry? The correct response may be to seek imaginatively and innovatively for ways of implementing the same principles with less demand for expensive equipment and scarce types of human resources. It is important, therefore, that innovative efforts be undertaken along these lines in newly developing countries as well as in highly developed ones.

It should be added that the difficulties foreseen because of equipment costs and scarcities of qualified personnel are probably no greater for an imaginative type of integration between academic and vocational elements in general education than for a system of separated academic and vocational schools. The advantage could even be with the integrated curriculum, measured on an effectiveness-cost basis, especially in view of the fact that the separate vocational schools are not only more expensive than general schools but very often suffer from inferior prestige, underutilization of their costly equipment, and wasted training of persons who do not in fact follow the trade for which they are trained. A strong effort of research -- combining imaginative experimentation with careful evaluation -- is needed on these problems in countries at various levels of modern development.

PRE-OCCUPATIONAL EDUCATION

Phase 2 in the model presented in this study is not to be thought of as sharply separate from Phase 1, but rather as a continuation of it with progressively more emphasis on practical preparation for the world of work. If the school curriculum in the first or general education phase integrates "academic" and "vocational" elements right from the start, as many educators are now advocating, the transition to Phase 2 can be very gradual, indeed.

The concept implied here with respect to the relation between general education and specific occupational preparation is one of successive "focusing down," like a movie camera which first pictures a landscape in broad perspective, then comes in closer to examine a few selected portions of the scene more intensively, and finally settles on a quite narrow portion of the whole for a detailed, even microscopic, view. The latter stage, which represents specific job training, should occur according to our model at or near the point of entry into a job. The intermediate stage -- a focusing on and sampling of selected portions of the scene, but still with a moderately wide perspective -- represents "pre-occupational education."

Tasks of Pre-occupational Education

Pre-occupational education should, ideally, provide each student with:

1. Information about occupational opportunities.
2. Assistance in discovering his own aptitudes and interests and in relating these realistically to occupational possibilities.
3. A set of basic skills, knowledge, and work habits pertinent to some family of occupations and sufficient to make him employable at a beginning level.
4. Learning habits and techniques which make him readily trainable on the job.

Schools should undertake in the phase of pre-occupational education to acquaint their students with occupational opportunities likely to be available to them in the not too remote future (example, local job expansion likely to result from a recently adopted development plan). For this purpose the schools need accurate information about requirements of different kinds of jobs and about trends in the labor market, both for their own vicinity and for places to which their students might migrate. Lack of such information in many developing countries contributes to the tendency for uninformed students to seek employment in the civil service, mainly in administrative and in clerical jobs, even after supply and demand conditions have altered in a way to reduce the opportunities in these fields and to render new fields, such as those demanding technical training, more promising. Here is a very important area for cooperation between the employment system (represented by public and private employers, development and manpower planners, labor ministries, and trade unions) and the education system. In many countries this type of cooperation might usefully be stimulated and mediated by the type of organization which we have symbolized as an OTO (see Chapter 5).

Assistance to students in discovering their own aptitudes and interests and in learning to make a realistic appraisal of these in relation to occupational opportunities calls for programs of testing and counseling. Also, and no less important, are activities -- curricular and extracurricular -- which enable a student to try himself out while sampling a variety of different kinds of work. Work-study programs in which students spend part of their time in actual jobs have often proved valuable in this connection.

In the phase of pre-occupational education, while the student is still in school, still fairly immature, and generally has no firm job commitment either from his own side or that of a potential employer, it is generally a mistake to try to train very specifically for a narrowly defined occupation. However, students who will be terminating their formal education do need to be able to present themselves to potential employers with a set of basic skills, knowledge, and work habits sufficiently developed to make them good candidates for employment. They need to have the fundamentals that will enable them to learn rapidly on the job. And, as emphasized before, they should have sampled various kinds of real or simulated work experiences as part of the process of discovering their own aptitudes and interests.

A useful way of meeting these various requirements in the pre-occupational phase of education is to guide each student into gradually increasing concentration on a chosen area of skills and knowledge related to some broad family or cluster of occupations which seems most suited to his aptitudes and interests. Thus, some students in this phase might be steered toward basic studies and practical exercises related to agriculture, others toward commerce, mechanical industries, homemaking, health occupations, and so on. The aim would be to develop entry-level qualifications related to families of occupations, together with good learning habits and techniques, in order to produce a trainable person -- not one fully trained, but one who can learn readily on the job.

Under this concept of pre-occupational education the student avoids premature commitment to a large amount of specific training in skills which he may not in fact use. Instead, his pre-occupational education develops readiness to receive specific training. It also gives him enough breadth of basic preparation to make him adaptable for future transfers and retraining. It is important to note, however, that this strategy with respect to the school's role in pre-occupational education can be fully effective only if another aspect of the strategy is also carried through, namely, adequate provision for training in employment (to be discussed below).

Pre-occupational Education in the School Sequence

At what level of schooling should the phase of pre-occupational education occur? The answer is two-fold. First, some aspects of pre-occupational education should be interwoven with general education from the start, as already emphasized. Second, a more intensive dose of somewhat more sharply defined pre-occupational education -- focused usually on broad families of occupations -- should come during two or three years just before the likely terminal point of the student's formal education. Since different groups of students terminate at different levels, this means that there must be provision for pre-occupational education at several levels on the formal educational ladder.

The first educationally sound terminal point might be identified in terms of the minimum length of schooling necessary to provide the child with a basic level of knowledge, skills, and aptitudes held to be necessary for citizenship and for economic and social well-being. No doubt most educational planners would place this first terminal point at least as high as five, six, or seven years of schooling, as is implied in widely accepted targets for universal primary education. The last two years of primary school might, therefore, be considered a level where serious efforts should be made to accomplish, in ways appropriate to the age group, some aspects of the tasks outlined above for pre-occupational education.

Doubts arise, however, as to what realistically can be done or ought to be attempted at this level. Research to evaluate the successes and failures of diverse present practices in various school systems, experiments with new practices, and development of tested teaching materials and teachers' aids are badly needed. Among the knotty problems that have to be faced are these: Should there be a strong agricultural slant to primary education in rural areas? This has sometimes been advocated, but there are also grave difficulties and objections. Should traditional crafts be taught (weaving, pottery, basket-making, etc.)? As means of earning income, or as general cultural background, or for artistic expression, or to provide homemakers with "do-it-yourself" skills? There are a host of such questions, especially pertinent in newly developing countries where for some years even completion of primary school will be a hardly attainable target for large proportions of the child population. Yet the amount of imaginative experimentation and careful evaluation of old and new practices bearing on such problems seems to be pitifully small.

One worthwhile suggestion for supplying occupationally related education and training to the great numbers in newly developing countries who go no further than the primary school (or even drop out before completing primary) is that they be given a second educational opportunity a few years later, after they have reached working age. In other words, their interrupted education would be resumed. In such a scheme, the tasks of pre-occupational education discussed above might be part of the agenda of the resumed education. Many of those returning to school after interruption would, however, have committed themselves rather definitely to a particular occupation. The curriculum design of the resumed schooling should, therefore, be adaptable to needs associated with Phase 3, job-entry training plus further education, and Phase 4, career-long training and retraining plus further education.

The four regional colleges of education run by the National Council of Educational Research and Training in India are experimenting with programs of resumed education in vocational agriculture. The idea is that instead of attempting to teach agriculture to pupils too young to practice it or to have much influence on the practices of their elders, or to youngsters whose main motivation in school is to find a way out of agriculture, a second round of schooling with a definite agricultural focus will be offered to youths already committed to farming as an occupation. Recruits are drawn from the age group 16 to about 25. The course is for two years, nonresidential (made possible by bus transportation), and stresses modern agricultural practices. Parents must agree that the student will have the use of a plot of land for his own supervised farm work.[1]

A second regular exit-point from formal education, to be preceded by pre-occupational instruction and counseling, might be identified at that level where most of the students reach the customary age for starting remunerative work. This would be somewhere in the middle or upper secondary level in most countries (about ages 14 to 18).

A third terminal stage might be identified at the post-secondary (junior college) level. Here pre-occupational education would focus especially on preparing future teachers, technicians, and other subprofessional and submanagerial groups.

A fourth terminal level, and even a fifth, with corresponding attention to pre-occupational topics and counseling, would be associated with university and post-graduate higher education. The occupations involved at these levels would be the professions, such as medical practice, law, public administration, high levels of management, high levels of teaching and educational administration, scientific research, and so on.

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[1] Information from observations and interviews in India by the author.

Work-Study Programs

A useful device for linking classroom instruction to work experience is the cooperative work-study program. By arrangement between the school and cooperating employers, students undertake part-time paid employment while continuing their studies. The device is likely to be most valuable when planned and supervised by school instructors and when a systematic effort is made to build some of the classroom discussion around realistic problems drawn from the work experience. Cooperative work-study plans may provide needed motivation for certain kinds of students, and they have the added advantage of helping the student financially.

This type of program has been used successfully at various levels: secondary, post-secondary (junior college), and university. Sometimes the employment hours are daily or several times a week after school, or certain full days or weeks interspersed in the classroom schedule, or periods of several months alternating between full-time employment and full-time schooling.

Work-study or "sandwich" type arrangements provide a valuable linkage between the school and the world of work and help to smooth the student's transition between the two. They are appropriate not only in Phase 2 (pre-occupational education) but also in Phase 3 (job-entry training, with further education) to which we now turn. Phases 2 and 3 are both concerned essentially with the transition from school to work -- Phase 2 from the school side, Phase 3 from the work side.

JOB-ENTRY TRAINING WITH FURTHER EDUCATION

The transitional period comprising entry into a first regular job and the initial years of a person's employment is particularly significant in occupational education and training. Specific job training and work experience intermixed with further education are needed. Ideally, in fact, school-leaving and entry into the world of work might become a gradual process. At one of several points -- which one depending upon how much general education the country and the individual can afford and on aptitudes and interests -- young persons would begin to work part-time at various trades, professions, and other productive occupations while also engaging part-time in further education and in specific training. The entry into paid employment would be in graduated steps, and opportunities for repeated exposure to formal learning processes would continue throughout the transitional period and, indeed, throughout life.[2] This would provide for good splicing between school and employment and for a flexible allocation of education and training responsibilities between the school system and the employment system, permitting best use of the particular strengths of each.

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[2] Suggestions along this line were made by Clarence Faust a few years ago (David 1966:44-46).

In-Employment versus Pre-Employment Training

So far as feasible, specific job training should occur during rather than before employment, or at any rate near to the point of employment and, if possible, after at least a tentative commitment to a particular type of employment (as in the case of a "sponsored" student in a trade school or technical college). Training, it should be re-emphasized, means in this context preparation to do a particular task or a set of tasks specific to a job or occupation.

While this general principle is sound and important, it does not apply uniformly at every level and in every case. It is less applicable, on the whole, it would seem, at the higher levels of professional and subprofessional preparation which require long and intense study best carried out in specialized institutions starting from relatively advanced educational levels. Examples are the occupations of physicians, electronic instrument technicians, engineers and assistant engineers, teachers and research workers at advanced levels, and top- or middle-level managers and administrators. Even for these people, however, the principle is valid in the sense that the commitment to the occupation or range of occupations involved should be rather definite in the mind of the individual before he and society invest the effort and expense of a long training for a specialized field. The principle applies more readily, no doubt, in connection with occupational training at the level of the skilled worker and the operative. The immediately following discussion is with these applications especially in mind.

The issues involved will be further discussed in Chapter 4 where the problem of determining the best allocation of institutional responsibilities for training programs will be taken up.

Meanwhile, the following five reasons suggest why, as a general principle, it is recommended that training, as contrasted with education, should normally be provided during employment or in close connection with definite employment rather than prior to an employment commitment:

1. Less Wastage from Unutilized Specific Training

Large wastage often occurs in expensive school programs of vocational training because some trainees drop out before completion of the course and others do not enter the occupation for which they are trained.

Training during employment rather than before helps to lessen these inefficiencies.

Hard data on the use or non-use of the specific vocational training received in school prior to employment are scanty, but there are some indicators from various parts of the world.

Interviews in 1967 with all accessible graduates of the 1963/64, 1964/65, and 1965/66 classes from two industrial secondary schools in Jordan showed that 27.7 per cent were in jobs where they utilized the specific trade skills they had learned in school (Al-Bukhari 1968a:13-19, 101-2).

In Tunisia, Al-Bukhari interviewed employed workers from several educational backgrounds, among them one category with three years in the industrial section of the lower secondary school (college moyen) and another category with at least five years in the industrial section of the regular six-year secondary school. He divided the curricula followed by these persons in their industrial-oriented school programs into four components: specific skills (that is, related to a particular trade or type of job), specific theory, general skills, and general theory. Then he ascertained, by eliciting the opinion of the worker and by direct observation, whether or not each of these various components was being utilized in the worker's present job. The following is a summary of his findings:

Figure 3-2

UTILIZATION OF SCHOOL-LEARNED CURRICULUM COMPONENTS BY CERTAIN TUNISIAN INDUSTRIAL WORKERS, 1967

	Workers with background of industrial section of:	
	Lower Secondary (college moyen)	Regular Secondary
Utilizing school-learned specific skills	35%	25%
Utilizing school-learned specific theory	57	70
Utilizing school-learned general skills	76	93
Utilizing school-learned general theory	100	100

Source: Al-Bukhari 1968b:63, 68.

While a number of questions can be raised about the reliability of this method of estimation, it does throw some light on the problem of relevance of specific trade training in school to actual employment thereafter. Note that 65% of the lower secondary group and 75% of the regular secondary group learned in employment the specific skills they were actually utilizing, though they had all had lengthy exposure to trade training in school. From this and other evidence, Al-Bukhari concluded that "the education system may not be able to prepare students, even with full industrial secondary education, for their specific future jobs. The employment system takes the products of the industrial sections of the schools and retrains then according to current needs. The net result is a waste of much of what was learned of specific skills in the educational system." The workers "found the general theory component of their school curriculum most useful in acquiring the new skills. Specific skills learned in school were least utilized in employment. Of intermediate usefulness were the general skills and the specific theory." (Al-Bukhari 1968b:70, 110.)

A study in the U.S. covering a scientifically selected sample of 1953, 1958, and 1962 vocational graduates found that only 30% took their first jobs in the same trade for which they had received training, 18% in a highly related trade, 15% in a slightly related trade, and 37% in a completely unrelated trade (American Institutes for Research 1965:5-16). Furthermore, "the figures indicate that even those who start out in the trade studied in high school do not necessarily stay with the trade."[3] Six years after graduation, for example, only 14.4% reported that they had held all of their full-time jobs in the trade studied.

2. More Realistic and Appropriate Training

In-employment training tends to produce more realistic training, attuned to real needs. The skills and working methods imparted are likely to be those in use or being introduced, rather than an outdated technology or, at the other extreme, a technology so new or expensive that its current use in the country is extremely limited.

Important aspects of training can best be carried on when the trainee experiences real working conditions. Pre-employment training in a school cannot duplicate, for example, the atmosphere of a factory or an office, the pressure for production, the problems of getting along with fellow workers and supervisors in a real job, or relations with customers. The fact that a school does not exactly duplicate working conditions offers advantages as well as disadvantages, for the school can concentrate on systematic, comprehensive training given in the proper sequence. Therefore, a combination of on-the-job and in-school training is usually better than either one separately (National Manpower Council staff, in David (ed.) 1960:156).

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[3] "The over-all conclusion is that the great majority of vocational course graduates do not work in the trade studied. Moreover, the majority does not work in either the trade studied or highly related trades. Most jobs held are in slightly related or completely unrelated trades, where relatedness is judged by the graduates. The conclusion is in contradiction to the findings generally reported by graduate follow-up studies. Perhaps this is because so few follow-up studies have been concerned with jobs beyond the first job after graduating." (American Institutes for Research 1965:9-35.)

One result of too exclusive reliance on pre-employment training is that the traditional skilled trades tend to be overemphasized, while newer and rapidly expanding occupations may be neglected. Also, because of the high value often placed by schools and their students on certificates, the training may be steered more by the examination system than by the real needs of employers. The examinations are too often outmoded, or, where internationally recognized examinations are used in the effort to maintain high standards, they may be inappropriate to local conditions. For example, in several West African countries where the syllabi and examinations of the City and Guilds of London Institute are used in trade schools, trainees for certain trades spend time learning to lay brick fireplaces or to hang wallpaper -- skills not pertinent to tropical Africa.[4]

Sometimes a fully rounded craft course as prescribed by syllabus and certificate requirements is wasteful. Boys at a trade training center in Enugu, Eastern Nigeria, after studying painting and decorating for three years, mostly go to work at spray painting of automobiles (Goldway 1962). A three-months' course focused on this particular job, organized for employed workers in cooperation with employers, would be more appropriate. The time saved could be used for additional science, mathematics, language, and basic shop skills. For workers who do in fact enter other kinds of painting and decorating jobs or later shift to them, appropriate short courses could be given at or near the time of employment.

Training during employment in intimate association with real tasks will have a wholesome effect in putting certificates into proper perspective and in supporting the efforts of those who are striving to reform inappropriate examinations. The best examination, after all, is performance on the job. If the employing organization is competently run, performance will be reflected in the employee's earnings and promotions (admittedly a big "if" in some environments).

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[4] Personal reports by observers. Also Goldway 1962.

3. Better Coordination with Demands of the Labor Market

When specific training is given during employment or in close relation thereto, "it is committed rather than potential workers who are trained," in the words of C. Arnold Anderson. "Under such conditions the numbers trained are likely to correspond fairly closely to the effective demand. Planning offices, by contrast, seldom can build forecasts for skills on solid evidence" (Anderson 1966:11). A system of in-employment training, in contrast to pre-employment training, provides immediate feedback from the evolving needs of employers to current training programs. Thus, it should result in quicker responses to constantly changing needs as some kinds of jobs become obsolete and new demands arise for others. There will be less waste to society and less frustration for individuals from misdirected training for non-existent jobs or from failure to train for urgently required new skills.

4. Earning While Learning

A system that trains during employment rather than prior to employment enables the trainees to earn something, even if less than a full wage, while learning. This can be very important in opening training opportunities to members of poor families for whom full-time training in an institution, even with free tuition, may not be feasible because of the "opportunity cost" of foregone earnings.

Another advantage of in-employment training is that it gives the learner greater security. He knows that if he does reasonably well he can count on continuing to have a job. Peter Kilby reports from West Africa that even when some of the trade centers for training craftsmen lacked a sufficient quota of applicants, the training schemes launched by large firms attracted large numbers of applicants for the reason that job security with the company was guaranteed (Kilby 1964:189-90).

5. Motivation for Learning

The learner who is being trained during employment can see very directly how his training relates to the job he is doing or about to do. Also, he sees how it relates to more advanced jobs being performed by others about him and to which he might hope to be promoted. Usually this source of motivation will be less intense in pre-employment training. Moreover, actual experience on a job is likely to make the training more understandable.

In some countries where the demand for places in secondary schools or universities far exceeds the supply, many students have to be eliminated, by examinations or otherwise, along the way. Vocational schools then tend to become a recourse for those who have failed to climb the regular academic ladder. Students come not with the intention of practicing the occupation for which the training is designed, but rather in quest of a back door through which they may try again to reach the higher academic levels. Their motivation for learning the trade skills taught in the school is low; they will not use these skills. This represents a serious wastage, intensified by the fact that the costs per pupil in a vocational school are several times those in a more academic institution.

The Work Experience Component

Of the three components in good occupational preparation -- education, training, and work experience -- one, work experience, can only be provided on the job. This may be simulated during training, but can rarely have the maturing effect or impart the same confidence as the real thing. On the other hand, a haphazard, unstructured, and educationally unsupervised work experience may provide learning mainly in bad methods of work or how to humor the boss.

In the early days of modern industrial development, the work experience component in learning a job was almost everything and the systematic training component little or nothing. As a student of industrial training in Britain put it, most young people entering industry in that country until quite recently have been "expected to learn what they are supposed to do by the time-honored process of 'sitting next to Nelly'" (Williams 1963:14). Today in newly developing countries most of the job learning in traditional industries, much of it in partly modern industries and commerce, and a large proportion in agriculture and other activities is picked up informally in work experience. Where traditional apprenticeship systems prevail, the instruction may be minimal and haphazard.

It must be said, however, that an informal system of training on the job can in some situations achieve fairly good results. And it has the great advantage of being inexpensive. For example, according to a study of a segment of the Brazilian capital goods industry, quite high skills have been developed in a large body of workers by an informal procedure in which a new shop employee is first put at relatively simple tasks and then step-by-step is advanced to more complex tasks, always alongside experienced workers who assist him as needed. Typically, these Brazilian skilled workers have entered the shop with only three to four years of formal schooling. Foremen generally have five or six years of schooling. The skill levels in these shops are good (Leff 1966).

This kind of preparation becomes less and less adequate, however, as a country develops more and more modern industry, modern agriculture, modern health services, modern governmental administration, and all the other innovations requiring better qualified personnel. Methods of work in all these fields continue to become more specialized and sophisticated, to require more understanding of theory and of complex techniques, and more managerial ability in planning and coordinating. In consequence, needs arise for both a better foundation in general education and more systematic training in combination with work experience.

The learning from work experience can usually be multiplied and be made more transferable to other subsequent work situations by arrangements which alternate periods on the job with periods in a classroom or instructional workshop or laboratory under the guidance of a qualified instructor. The instructor can help to build interrelations between concrete aspects of the job and general principles and competencies. Arrangements which alternate work experience with continued education and training of a systematic sort are highly favored by experts in these matters.

From "Apprenticeship" to "Training" for Skilled Workers

The concept of apprenticeship as a method of inducting young persons into the production system grew up in a pre-industrial age. A boy was indentured to a master for a period of years and learned a craft by helping the master and his journeymen. Under modern conditions, this traditional concept is much less appropriate. It is being replaced by the concept of training, which connotes the use of specialized instructors and a planned program, often combining formal instruction with supervised work experience. Furthermore, the concept of "apprenticeship" usually implies a need for learning the traditional lore of a craft, while "training" should suggest instruction based on analysis of particular jobs to be done.

Planners of OET in newly developing countries will be well advised to think in the broader, more flexible, and more modern terms of a "training system" rather than in the more confining and traditional terms of an "apprenticeship system." The reasons are of several kinds:

1. The Nature of the Jobs in a Modern Production System

Only a small and declining proportion of the jobs in a modern production system are capable of being defined along traditional craft lines. Specialized job skills, not craftsmanship in the old sense of all-round competence, are required of the major proportion of the labor force. By proper methods, these skills can be taught rather quickly to intelligent persons, especially if the trainees have a reasonably good background of general and pre-occupational education (that is, are "trainable" in the sense described earlier). At the higher skill levels, the increasing demand is for knowledge and skills approaching those of the subprofessional (technician), and this requires more abstract, theoretical understanding than is usually associated with apprenticeship.[5]

2. The Rapidity of Change in Skill Requirements

Constant technological and economic change is characteristic of a modern production system. This makes inappropriate a traditional feature of apprenticeship, namely, a long, fixed period early in the working career in which the young entrant learns a collection of skills presumed to qualify him in a certain trade for a lifetime. Nowadays, trades do not remain fixed in content. The appropriate response is more general education and broad pre-occupational education, shorter initial training in specific job skills, and repeated opportunities for further training and further education throughout the working career.

3. Inefficiencies and Inequities to Which Apprenticeship is Prone

A traditional form of apprenticeship obligates the learner to serve his employer for a fixed period of years with low compensation, if any, and the employer in return is supposed to teach the young worker his trade. If the employer is conscientious and either himself or through his workmen provides good examples and good teaching, skills can be imparted in this manner at low cost. Very often, however, especially in the conditions of newly industrializing countries, the young workers are exploited as a source of cheap labor and instruction is minimal. If there is instruction, it is likely to be given unsystematically by persons who, even if they are good workmen, may have little skill in teaching.

Of course, where an extensive apprenticeship system is already well established, the most feasible way to make progress may be to "modernize" it. This has been the approach of some of the Latin American organizations described in Chapter 4, most of which have "apprenticeship" in their names though "training" would more appropriately describe the bulk of their activities. To modernize an apprenticeship system there should be regulation and supervision of the apprenticeship contract, some means of verifying that instruction is actually given on the job, assistance in planning a training program and in improving the teaching qualifications of those who will execute it, provision for classroom-type instruction in the more theoretical aspects of the appropriate training, and provision for associated further education.

If a modernized apprenticeship program turns out to be substantially the same as what we have been calling a training program, there is no need to quibble about words. However, there are many modern skills to which apprenticeship is not now being applied and can hardly be applied. Furthermore, the need for instruction does not end with the period of youthful initiation into employment normally covered by apprenticeship. On the whole, newly developing countries will be more likely to find good solutions if they abandon the habits of thought associated with the term apprenticeship and adopt instead the more inclusive and flexible concept of training.

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[5] See on some of these points Liepman 1960:21.

Content of Job-Entry Training

An adequate job-entry training program would include:

1. Instruction in the Knowledge and Skill Components Specific to the Occupation and to the Particular Job (as soon as this is known), Adjusted to the Needs of the Entering Individual.

Whether this instruction is given by an employing organization directly or by an outside institution, such as a training center or a technological institute or a professional school of a university, its content should be based upon (a) occupational analysis, as discussed earlier in this chapter and in Chapter 2, and (b) the background, previous instruction, and attained level of competence of the individual concerned.

A proper relationship between the content of training and the actual requirements of real jobs depends upon frequent contacts and continuous cooperation between the trainers and the users of their products -- that is, employing establishments. The more specific the training -- meaning the more it is focused on how to do a particular job rather than on basic principles and techniques applicable to a wide range of jobs -- the more intimate these contacts should be.

2. Orientation to the Job

Part of the induction training of any new employee should be information on the basic purposes and procedures of the employing organization and the relation of his particular job to them. Just what is expected of the holder of the job should be made clear, along with any necessary instructions or suggestions on how to do it well. Indications on possible lines of advancement and how to begin acquiring the necessary qualifications for advancement will often be possible and helpful.

3. Work Experience Linked to Instruction

The new entrant in his first regular job will be acquiring realistic work experience. The value of the experience can be enhanced by a systematic effort on the part of training officers to relate a continuing part-time instructional program to the new experiences. Also, training officers in cooperation with supervisors can arrange to strengthen and broaden the work experience itself by such devices, where feasible, as assignment of the recruit to tasks of gradually increasing complexity and responsibility and giving him opportunities to participate in or at least to observe a variety of related kinds of work.

Importance of Further Education

Along with the specific training and work experience at job entry, it is highly desirable to provide for continuing education. This might consist of making up deficiencies, as in the case of workers who have not become literate or who have gone only part way through secondary school. Or, in the case of the better-educated, it might be very advanced instruction in some of the newest scientific or mathematical developments or in frontier areas of human relations, administration, and management.

Modern industry and agriculture, modern commerce, transport, and services, modern public administration, business management, and homemaking, all require increasingly sophisticated backgrounds of knowledge. Also, the rapid pace of technological and economic-social-political change in the newly modernizing as well as in the modernized countries makes it essential for qualified personnel at all levels to be adaptable, able to learn and relearn as job requirements and environmental conditions change. Hence, not only a trained work force but an increasingly well educated work force is needed.

Among the many progressive features of the Industrial Training Act adopted by the United Kingdom in 1964, one of the most important is the obligation laid upon Training Boards to give attention not only to training but also to "further education to be associated with training." While a formal division of responsibility is recognized -- industry to provide skill training to meet specific requirements and the education authorities to provide education services -- the Central Training Council created under the Act has emphasized that "further education and training are complementary aspects of a single process." Each should reinforce the other.

The reasoning behind the important principle that "recommendations on training should include, as an essential element, associated further education," has been set forth in Council statements (United Kingdom, Ministry of Labour, Central Training Council 1965, 1966):

> "In recent years it has ... become generally recognized that a programme combining education and training is essential if people in industry are to be equipped to carry out their work effectively as well as to have the opportunity to advance to more demanding and responsible work.... We cannot emphasize too strongly that the more effective integration of the elements of technical education, systematic instruction in the basic skills, and practical experience, under supervision, on the job, must be one of the main objectives for industry and the education service alike...."

Four main purposes of the further education which is to be provided along with specific training are:

> "(a) to provide the knowledge and appreciation of techniques necessary to enable a trainee to do his job;
>
> "(b) to indicate a broad understanding of relevant science and technology so that the trainee appreciates the problems of those working in associated occupations and is also better equipped to adjust to changes in the nature of his work;
>
> "(c) to widen the trainee's understanding of the society in which he lives and to develop him as a person; and
>
> "(d) to prepare suitable trainees for more advanced study leading to more highly skilled work."

The provision of further education for employed persons should, ideally, be a shared responsibility of the education system and the employment system. Curriculum design will benefit from continual interchange of ideas from both sides. In most cases, actual instruction is probably best carried on by educational institutions -- primary, secondary, and adult schools, technical colleges and universities. But extra financial support and special kinds of help, such as part-time contributions to instruction by experienced persons from industry, government, and commerce, ought to be forthcoming from the employment system.

CAREER-LONG OPPORTUNITIES FOR EDUCATION AND TRAINING

In view of the rapid changes in occupational roles which must occur as the process of modernization goes forward, and in view of the continual technological and other changes characteristic of a modernized economy and society, is it really useful to proceed in educational planning as though at some fixed point formal education terminates and "life" and "work" take over, accompanied only by informal, unplanned learning? Would it not be better in the newly developing countries (and the highly developed ones also) consciously to plan educational and training systems so that formal learning opportunities recur throughout a person's working career?

These are reasons for urging that educational theorists, planners, and policy-makers think in terms of the "super-curriculum" of a lifetime and cease to neglect the "second education system" -- that is, the extra-school system which includes all sorts of agencies and institutions concerned with further training and retraining and further education for men and women already in their active working years.

This second education system has already grown to quite large dimensions in some of the highly developed countries. In the United States there are estimates (quite speculative, for no accurate data exist, the attention of educational statisticians having been concentrated on the regular education system) which would place the expenditures of U.S. business and industry for in-service training and education at a total of perhaps half as much as the total expenditures of the regular school system.

In terms of occupational education and training, the job-entry period and the initial years of a person's employment are particularly significant. Work experience intermixed with specific job training and further education are needed. But training and further education should not terminate at the end of the initial employment stage. Repeatedly there should be new opportunities to upgrade the person's level of competence, to renew his knowledge and skills so as to keep him abreast of changes in his field, and to assist in transfer to other fields when that proves desirable.

The concept of career-long education and training as a formally planned feature of an environment where knowledge and occupational requirements are ever-changing is still somewhat unconventional, but thought is moving in this direction.

It may be necessary to re-examine traditional practices with respect to educational degrees and training certificates. In a world of such rapid change, should these be issued for a lifetime? Or should they carry expiry dates, like certain medicines or an automobile driver's license? More feasible, no doubt, might be a gentler break with the past in which the degrees and certificates would not formally expire, but dated supplements would be offered, to be obtained by demonstrating updated knowledge and skills. Thus, one might see diplomas like:

"Ph.D., Chemical Engineering, 1950, updated 1963," or "Master Electrician, 1955" with a gold star marking "Renewed 1969."[6]

Some Examples

An interesting experiment in an Asian country proposes to develop three types of "career streams" taking off from three different levels of formal schooling. The experiment is aided by the Center for Management and Industrial Development, Rotterdam, Yap Ki Han, Director, and by the SAIFFEE Foundation. The first career stream links with primary education and provides in-plant apprenticeship to the age of about eighteen to twenty years, after which the persons may qualify as skilled workers. At the age of twenty-five to thirty, further training and technical upgrading takes place to develop these persons either into first-line supervisors or into master craftsmen qualified to operate their own workshops. The second career pattern takes off from secondary education and aims at developing qualified technicians who later, after a two-year "junior entrepreneurial training course" will be encouraged to establish and operate their own mostly small-scale undertakings. The third pattern joins with the college and university level of education and provides training for senior engineering and middle management functions and ultimately for senior leadership posts in medium-sized and larger companies. The three career streams are to be linked at appropriate places for cross-transfer, so as to provide the flexibility required by the industrial scene and for individual development (Yap 1966:11-12).

Lady Gertrude Williams in her book Apprenticeship in Europe describes several successful systems of further OET for adults. France has an excellent system of adult occupational training, FPA (Formation Professionelle des Adultes) administered by a tri-partite body representing employers, workers, and the Ministry of Labor. Admission is open to anyone between the ages of 17 and 46 who can read and write, though more than half the participants are young men below 20. Many are semiskilled or unskilled, and many have previously begun but not completed an apprenticeship or trade training course and are getting a second chance to become skilled men. An inquiry some years ago revealed that the percentage of trainees working after four years in the job for which they had been trained was 65 in the building trades and 66 in the metal industries. Including those in closely related jobs, the percentages were 72 and 80. "These figures represent a very high degree of success" (Williams 1963:97-101). This degree of actual utilization of training received at the adult stage is particularly impressive when compared with some of the more dismal figures cited earlier from various countries on follow-up studies of graduates of vocational secondary schools who received trade training prior to employment. Unfortunately, the scattered studies available are in diverse environments and for noncomparable groups, so we cannot reach definite conclusions, but these indications do at least suggest that the relative efficiency of various kinds of training and the timing of the training deserve more study.

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[6] After this was written, I heard (but have not yet verified) that at Saclay, France, there is a school of atomic engineering which gives a degree valid for only five years. To renew it, the degree holder has to pass an examination or present a piece of research.

Sweden, as reported in the same book, provides a system of accelerated training for adults under the aegis of the National Labor Market Board and the National Vocational Training Board. The courses are of three types: (1) beginners' courses for those from 17 to 25 who have not been able to get a place in a vocational school; (2) retraining courses for persons over 18 who are redundant in their own jobs and prepared to learn a new trade; and (3) continuation courses to improve the skills of persons over 18 who intend to remain in the same occupation. The instructors are all skilled men of experience in the trade they teach, but they are not allowed to instruct until they have had three weeks of training in methods. Accelerated training has also been developed by some industry groups at their own expense. In the textile industry courses are financed by a levy on all the firms in the trade, and it is estimated that nearly half the workers have attended the courses. The employers' association has full-time training specialists on its staff to advise firms on their training programs. The unions are very ready to cooperate, since most employees are on piece rates and the training has enabled them to get an increase of about 30 percent in their earnings (Williams 1963:154-156).

In The Netherlands an adult training scheme for unemployed persons has had considerable success. It applies to persons between the ages of 18 and 50 and includes: (1) training for a new trade, to help those who have a skill that is no longer so much in demand; (2) training for skill, to aid those who have had no special vocational training or skilled experience but who show capacity to learn; and (3) providing refresher courses for those who have practiced a trade in the past but have left it and need to be brought up to date. Before the trainee leaves the training center a suitable employer is found, and for the first year of his employment the firm receives an allowance (Williams 1963:68-71).

In the United States, a work on Retraining the Work Force: An Analysis of Current Experience (Hoos 1967) provides case studies on the chief types of agents engaged in adult job-skill development: adult vocational schools, civil services, private companies, labor unions, and the federal government. Among the study's many significant conclusions, the following are especially pertinent to our present discussion: Retraining is essential to cope with technological change; of 23,000 job categories in the new Dictionary of Occupational Titles, some 6,000 were non-existent ten years earlier. If the educational base provides basic knowledge of fundamentals, then it is much easier and more effective to train for specifics when the requirement comes; such things as mathematics and communication skills are very important. Educational background is highly correlated with response to training opportunities. There are outstanding exceptions, but carefully planned retraining programs are a rarity in industry. Civil service units have done better than private industry thus far in retraining; the Internal Revenue Service, for example, has an excellent program. There is a considerable ferment of experimentation in retraining at the present time, connected with the high interest in improving the status of minority and underprivileged groups and meeting urban problems. The influence of some of the new special agencies is forcing cooperation between school systems and organizations concerned with employment and the labor market. Bringing educators closer to the realities of the work world may help to reform the archaic vocational-education system.

Continuous Updating of Science Teachers: Japan

One of the leaders in the reform of science education (especially biological science) in the United States, Bentley Glass, has stated most emphatically the necessity for frequent renewal of the professional knowledge of teachers. Japan, he reports, is setting an example.

> "The increase of scientific knowledge is at present proceeding exponentially, with a doubling time of approximately ten to fifteen years. The useful lifetime of a scientific treatise or textbook is currently about equal to that of an automobile (five years), and the obsolescence of a trained teacher of science covers the same span of time....
>
> "In an age when numbers of discoveries of startling significance are made every year it is imperative to design a system for the renewal of science training that will keep the teachers in our schools abreast of modern science. To what end the teaching today of the science of thirty years ago? The world in which our students and their teachers are living is the world shaped by modern science; and the new ideas of today -- decipherment of the genetic code, transmission at the nervous synapse, chemical storage of memory, controlled mutation, the antiquity of the human species, to single out a few in biology alone -- shape the world of tomorrow" (Glass 1965).

The Japanese, Glass reports, seem to have recognized this problem far better than any other nation. The Japanese Ministry of Education has established a science education center in each of the country's thirty-nine prefectures, and every secondary school science teacher must periodically take seminars and courses in one of these centers. Compulsory renewal of training for the science teacher, he continues, must shortly become a standard feature of professional life everywhere. Careful study will have to be given to determine the preferable arrangements. Perhaps a half year in every five ought to be devoted to renewal of training, or perhaps evening and weekend courses can be relied on at first. Educational budgets must allow for additional teachers to take the places of those on leave from their classrooms for renewal training.

High Priority for Education and Training of Working Adults

One of the gravest errors in the planning of education and training programs in nearly all countries is under-investment in education and training for adults. This applies to a wide range of educational activities, including general education (not merely literacy, which should be a means rather than an end), agricultural improvement through education and extension work, and education for community development and citizenship. It applies emphatically to occupational education and training.

W. Arthur Lewis has put succinctly a truth that could usefully be framed on the wall of every planning office concerned with educational aspects of development: "Education for children is fine, but its potential contribution to output over ten years is small compared to the potential contribution of efforts devoted to improving adult skills.... The quickest way to increase productivity in the less-developed countries is to train the adults who are already on the job" (Lewis 1961:121).

V. K. R. V. Rao, economist and former education member of India's Planning Commission, writes of his country that "unfortunately, adult education programs have not received priority in our educational policy.... Education at the adult level is absolutely essential from the point of view of economic development...." (Rao 1964:8-9). From a highly industrialized country, the United States, there is testimony that "many vocational educators feel that evening and part-time courses for employed workers are the most effective part of the trade and industrial program.... Almost all evening and part-time courses are now devoted to extending the skills of employed workers" (David 1960:164).

A weighty argument for high priority to education and training for working adults is the immediacy of the return. This is a very important advantage in countries where the problem is to get economic growth started and, thus, to generate the added production and income which will make it possible to achieve other educational goals.

To put the matter in more technical economic terms, in countries where capital for investment is scarce and interest rates high, the "discount on futurity" is also high; income this year is worth considerably more than the same amount of income several years hence. At a ten percent annual compound interest rate (a conservative figure in the conditions of newly developing countries) a unit of output produced this year is worth 2.6 times as much as a unit to be available ten years from now. Or, looked at the other way round, the present value of one unit to be received ten years from now is only 0.38 units.

There are many other strong arguments for high priority to adult education and training. P. G. H. Hopkins in a noteworthy paper on "The Role of Adult Education in Economic Development" for the Nyasaland (now Malawi) Economic Symposium in 1962 (Jackson 1965:1-70) presented eight:

- Even the best childhood education will be inadequate for a lifetime spent in the modern, rapidly changing technical world.
- Adult education is needed to remedy the weaknesses of past and present school systems.
- Adult education is needed so as to create an atmosphere of respect for education which will encourage children to pursue their studies with keener interest.
- The flexibility of informal adult education in contrast to the rigidity of most school systems offers greater potential for a break with cramping traditions and for large-scale experiments.
- Many important issues require from the students a wide experience of life and are better dealt with by adult minds and adult study methods.
- If the modernizing influence of education reaches only the new generation, the tensions between children and parents will become even greater; adult education is necessary to help bridge the gap between traditional elders and adventurous youth.
- The returns on educational investment in adults can be substantial.
- From the viewpoint of efficient use of educational resources, adult education has good claims for priority.

This last point deserves special emphasis. Quoting Mr. Hopkins:

> "School education is usually compulsory, either by law or by parental order; adult education is voluntary -- and 'a willing horse can drag a heavy load'. Holger Begtrup, the principal of a Danish Folk High School, concluded after many years of experience: 'The same amount of information which it takes a half-grown youth dozing on the school benches three to five years to learn, can be acquired in the space of three to five months by adults who are keen on learning and who have done practical work'. Many experiments in informal education have corroborated the essence (if not the mathematics) of this....
>
> "What entrepreneur could afford to ignore Begtrup's estimate of a cutting to one-twelfth of his production time? How can emergent governments afford to neglect the time-saving and cost-reducing nature of adult education?"

Priorities in education and training for adults should probably go to working adults and to comparatively young adults (say ages 20-35). Results achieved with working adults are reflected immediately in productivity and begin at once to increase the income stream which makes possible higher consumption levels and more investment in education and other developmental activities. Comparatively young adults are probably on the average more receptive to new ideas and learn more quickly. They have more years remaining in their working lifetime during which any productive effects of their education and training can yield returns to society.

All in all, it seems highly probable that investment in the training and further education of persons already committed to an occupation and having substantial experience on which to base further learning would yield higher developmental returns in most newly modernizing countries than equivalent investment in uncommitted and inexperienced persons. (The evidence is scattered and unstudied -- only suggestive, not conclusive. This is a field in which investigations are needed.) Planners of occupational education and training to meet the needs of development should, at the very least, pay much more attention to building up and using the "second education system." There may even turn out to be a case, when the question has been more thoroughly investigated, for making the second education system as important in development plans and in fund allocations as the regular one!

CHAPTER 4

INSTITUTIONAL CHOICES

No country starts with a clean slate in designing an occupational education and training system or improving an existing one. There are going institutions, traditions, practices, and points of view. There are constraints imposed by scarcities of qualified instructors, administrators, and financial resources. Since no two situations are exactly alike, it is impossible to propose institutional arrangements that can realistically be recommended for all or even a majority of cases.

What can be done, and what will be attempted in this chapter, is to illuminate the institutional choices that may be open to policy planners and implementers of policy. "Institutional" in this context refers to schools, training units in employing establishments, training centers, development agencies that carry on occupationally oriented education and training as part of their work, and other bodies for actually doing the job of providing necessary learning experiences to produce qualified personnel needed in economic-social-political development. The next chapter, entitled "Organizational Choices," deals with mechanisms for the over-all planning, coordination, and financing of OET.

Perhaps the three most important lines of thought that should stand out in the following discussion are these:

1. A considerable number and variety of institutions can (and do in many countries) contribute substantially to OET (see Figure 4-1). Hence, the scope of institutional choices facing the astute planner is a broad one. Possibilities for constructive institution-building are at least as numerous and significant outside the formal education system as within it. Yet the non-formal or extra-school aspects of OET are too often neglected in planning for human resources development.

Figure 4-1

INSTITUTIONS CAPABLE OF CONTRIBUTING SUBSTANTIALLY TO OET

1. In the Regular Education and Training System (School System)

    1.1 General Schools
    1.2 Occupationally Specialized Schools
    1.3 Other Special Schools
    1.4 Adult Literacy and Fundamental Education Programs

2. In the Second Education and Training System

    2.1 Employing Establishments
        2.11 In the public sector
        2.12 In the private sector

    2.2 Training Centers and Collective Training Programs in the Employment System
        2.21 Trade Associations
        2.22 Labor Unions and Professional Associations
        2.23 OTO-Type Organizations

    2.3 Training Centers and Programs of Government Labor and Social Services

    2.4 Educative Development Services
        2.41 Agricultural Extension, Rural Community Development
        2.42 Industrial Extension, Productivity Centers, Small Business Programs
        2.43 Health, Family Planning, Parent Education Programs

    2.5 Military Services

    2.6 Volunteer Services
        2.61 Export Volunteer Services
        2.62 Domestic Volunteer Services
        2.63 National Youth Services

    2.7 Communication Organizations
        2.71 Radio, Television, Films
        2.72 Press and Publishing
        2.73 Libraries, Museums, Fairs, Exhibitions

    2.8 Correspondence Schools

This is unfortunate, because the greatest opportunities for immediate payoff may be in more effective utilization of the relatively little studied and amorphous "second education system" comprising all agencies of education or training not under the regular education authorities.

2. A broad strategy is necessary for "orchestrating" the potential contributions of many agencies, so that they supplement and harmonize with each other. Thereby, the best use can be made of all available institutional and other resources, to achieve the goals of OET at a favorable ratio of cost to effectiveness. One of the key issues is how to distribute responsibility for various aspects of education and training between the school system on the one hand and the employment system on the other.

3. Effective "linkage" between the formal education system and the employment system, and between each of these and other relevant institutions and agencies, is something to be sought and planned for. How can the emerging demands of the labor market be made known to and through the education system and be reflected in its policies? How can links be established and maintained between education curricula and the training activities of employing establishments and of training centers run by or in cooperation with employers, labor unions, and various agencies not primarily educational?

TYPES OF INSTITUTIONS

Institutions that can help to carry out the practical work of occupational education and training are grouped in this chapter into a number of types. This is not a rigorous classification scheme; some types overlap with others. We are dealing here with a highly variegated assortment of institutions; they exhibit crisscrossing similarities and differences from country to country and even within the same country. They cannot be forced into any manageable set of mutually exclusive categories.

The two main groups of institutions are those in the regular education and training system (school system), administered by the ministry of education or whatever the agency or agencies may be called in a particular country, and all the rest, designated here as in the "second education system." The first four subgroups in the second education system (see Figure 4-1) either represent or are fairly closely linked to the employment system: employing establishments, training centers and collective training programs in the employment system, training centers and training programs of government labor and social services, and educative development services. For some purposes it is convenient to think of these four subgroups as a separate major category. Thus, one can speak about institutions in the school system, in or closely linked with the employment system, and all others (military services, volunteer services, communication organizations, correspondence schools).

General Schools

These are the institutions in the regular sequence by which persons acquire a general education -- from kindergarten through primary, secondary, and junior college or university. In most countries they are run by public authorities (national, provincial, or local), but in many a significant role is also played by private bodies (religious, commercial, or other).

In terms of the four-phase model for OET developed in this study, the fundamental responsibility of the general schools comprises in Phase 1 (general education) and Phase 2 (general plus pre-occupational education). In addition to this exceedingly important primary responsibility, general schools should share a cooperative responsibility for the further education aspects of Phases 3 and 4.

The central, unique, and all-absorbing task of the general education institutions, under this concept, is education (not training). They should aim to produce broadly educated people who are equipped with basic skills, knowledge, and personality traits needed in most occupations. They should also give these people orientation to the world of work and the introductory skills and knowledge to qualify them for job-entry and/or specialized training in some selected range of occupations appropriate to their aptitudes and interests and the realistic possibilities of their environment. General schools should not, as a rule, attempt to carry the burden of producing fully trained people for the employment system. (Some exceptions to this rule are justifiable, as will be seen later.) Their sufficient task is to produce readily trainable people.

This doctrine is workable, of course, only if other institutions -- occupationally specialized schools, and institutions in or closely linked to the employment system itself -- do in fact provide reasonably adequate training at or near the point of job entry and in employment. Here is one of the areas of greatest weakness in the OET systems of most newly developing countries. Absence of adequate training in or closely linked to the employment system tends to force upon the general education system a burden of specific training which it should not have to bear and which it is likely to perform unsatisfactorily at excessive cost.

Occupationally Specialized Schools

We find occupationally specialized schools corresponding to all levels of the educational ladder and serving nearly all occupational fields. Some are separate, independent institutions; others are departments, professional schools, or faculties within a broader institution.

Some examples, starting at the highest educational level and working down:

- -- University and university post-graduate professional schools preparing physicians, engineers, lawyers, scientists and technologists, higher level managers and administrators, teachers and educational administrators, journalists, artists, humanistic scholars, etc.
- -- Post-secondary institutes or specialized departments of junior colleges preparing technicians and other subprofessionals, including draftsmen, assistant engineers, nurses, medical and dental assistants, farm advisers, teachers, supervisors in industry and commerce, etc.
- -- Secondary vocational schools and specialized departments of comprehensive secondary schools preparing skilled workers such as auto mechanics, masons, painter-decorators, machinists, stenographers, clerical and sales personnel, modern farmers, etc.
- -- Primary schools emphasizing simple crafts for occupational and not merely general education purposes, for example: weaving, basket making.

Some of these schools emphasize occupational education, others occupational training, others both. The higher-rated professional schools nowadays give their students a broad, educational exposure to the natural science and social science disciplines related to their specialties, and some even provide excellent work in the humanities. They tend to avoid highly specific training, preferring to produce soundly based people who can learn specific tasks as quickly as necessary -- on the job, or in short courses, or by independent study, or some combination of these.

At the subprofessional level and even at the skilled-worker level there is also a strong tendency nowadays among occupationally specialized schools of high quality to combine with their specific training a fairly broad educational element. Basic science, basic skills in oral and written communication, and basic knowledge of the human and social environment are recognized as more and more necessary for effective performance in a modern-type job, for relearning and adjustment in response to changes in the nature of a job brought about by the inevitable changes in technology, and for making successful transfers from one job or occupation to another.

Aside from these purely occupational reasons for an educationally broadening approach, even in specialized institutions, there are, of course, considerations of personal development and of social and civic responsibility which point in the same direction.

Speaking particularly of vocational secondary schools which prepare skilled workers for industry, a study by the ILO secretariat (ILO 1967) remarks that, "They should ensure that theoretical and practical training progress in step with each other; they should continue the pupils' general education and provide the link between school life and the world of work; they should enable their trainees to acquire their practical skills systematically, unhampered by the requirements of industrial production." Unfortunately, the same report continues, many of them have serious shortcomings, summarized as follows:

"(i) the serious lack of balance between the numbers trained for a particular occupation and the number entering that occupation, since the majority of those trained often seek and obtain employment in other sectors, such as the army or the administration;

"(ii) the considerable wastage during training which greatly increases the cost per pupil trained;

"(iii) the insufficient adaptation of the training to conditions of work in enterprises, as well as to the speed and quality required on the job;

"(iv) the shortage of personnel and incompleteness of equipment, since the funds available are not always adequate for the needs of technical institutions; and

"(v) the inadequate qualifications of teaching staff, particularly workshop instructors."

In terms of the four-phase model, occupationally specialized schools perform a bridging function between Phases 2 and 3 -- or between Phases 1 and 3, or other combinations in special circumstances. They generally provide or supplement the pre-occupational education of Phase 2 and also some of the job-entry training and further education of Phase 3. Many also provide further training or retraining and supplementary education for experienced workers, which is Phase 4. When they do their jobs well, they serve as links between the general education system on the one hand and the employment system on the other.

Other Special-Purpose Schools

Schools for the handicapped -- to serve blind persons, mentally retarded, etc. -- often devote much of their effort to helping their students acquire an employable skill. Such institutions should have a place in the planning of OET.

Employing Establishments

In most newly developing countries, most people learn the specifics of their jobs on the job, in employment. Farmers' sons learn farming from their fathers, perhaps with some help from agricultural extension agents. A traditional apprenticeship system functions in the smaller industrial and service enterprises. Large enterprises in the private sector, public services such as electricity supply and public works, and some government ministries generally find it necessary and beneficial to mount their own formal and informal programs for selection, training, and upgrading of employees.

For example, in Nigeria as of 1965 the Labor Requirements Survey estimated that some 10,000 employees in the modern sector were receiving some form of training other than on-the-job supervision. This compares with the following outputs in 1965 of training-oriented formal education institutions: craft schools (North) 648; trade centers 537; technical schools 365; technical colleges 444; secondary commercial schools 2,483; teacher training colleges 2,964 (EWA 1967:44-45). It is also worthy of note that the widespread apprenticeship system in Nigeria's intermediate sector enterprises has perhaps two million or more apprentices. These facts make it clear that occupational training in Nigeria, even in the modern sector, takes place _de facto_ mostly in employment, and almost exclusively so in the intermediate and traditional sectors.

One of the prime aims of OET planning, it would seem, should be to find ways of utilizing more fully and effectively the capacities of the more progressive employing establishments not only to upgrade their existing work forces and to train new recruits but also to contribute to the national pool of trained manpower. As suggested earlier, an objective of a good plan for OET should be to make every employing establishment a training establishment, preferably in close association with occupationally oriented schools, training centers, and educative development services.

Many employers have little appreciation of the value of in-employment training and little knowledge of training organization and techniques. Advisory services to help them organize training schemes and plan suitable programs, courses for instructors, and offers of well-prepared training materials will help in these respects. In the Netherlands and Sweden, for example, the training supervisory bodies employ a corps of travelling consultants to raise the quality of training (Williams 1963:172-3). Several of the occupational training organizations in Latin America, like SENA in Colombia and SENATI in Peru, cooperate with employers in preparing courses and instructors. SENATI trains training officers, lends them to firms that want help in installing programs, and hopes that in some cases the firm will hire the officer for its regular staff, whereupon SENATI will train another; in this manner the training resources of the country are increased.[1]

Large employers can mount their own training programs. Smaller employers will need to cooperate in group training centers or hire the services of training institutions. One of the functions of an OTO (see Chapter 5) would be to aid in such matters.

It is worth emphasizing that "employing establishments" in this discussion is meant to include both public sector and private sector employers. Ministries and other agencies of government and enterprises under full or partial control of government should recognize training as a continuous responsibility. In newly developing countries government is often the largest employer of qualified personnel. Frederick Harbison has well said that:

> Each major ministry of the government in developing countries should assume responsibility for upgrading its personnel; and ... it should maintain a training organization responsible for on-the-job and in-service programs of instruction, for supplementary off-the-job programs of training in cooperation with educational institutions, for periodic examination of accomplishment, and for certification of qualification for promotion, transfer, and advancement. In-service training is especially needed in underdeveloped countries because of the relatively meagre pre-employment education and the comparatively short experience of most employees....
>
> The top officials of these countries are likely to complain, however, that their organizations are too busy and too understaffed to afford the luxury of in-service training. They cling to the misguided notion that the high-level manpower for the future should spring full-blown from universities and technical schools. They fail to recognize the distinction between education and training, or the linkages between them in development of human resources.... Much of the expenditure on education will be wasted unless it is followed up by intensive and systematic training in the course of employment.
>
> It might be appropriate for governments to allocate a specific proportion of educational funds to in-service training programs in the major ministries. And, if governments did undertake such training and upgrading of personnel,

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[1] Interview with Dr. Fernando Romero, National Director of SENATI.

> they might be induced to go one step further and try to produce experienced people in excess of their own requirements in order to provide a spillover into the private sectors.... The greatest problem is to inculcate the idea that a major function of every government ministry is to build people in addition to engaging in routine activities.... (In Anderson and Bowman, eds., 1965:237-38.)

Will employers in the private sector be willing to devote to training the time, energy, personnel, and money that good programs require? The answer is that the more progressive and better-managed employing organizations do this now and find it profitable. Modern managements consider training to be one of their most important management tools. Well-planned and well-executed training programs are a means of giving leadership without coercion, oftentimes more effectively than by issuing orders. According to a British authority, "companies which have introduced systematic training have found that it has yielded direct benefits by the increased efficiency of their workers achieved in a shorter period of time, and that it has contributed notably to the lowering of the labor turnover and of accident rates" (Williams 1963:14). In other words, enlightened self-interest is likely to be on the side of good training programs.

There are problems, however, especially for middle-sized and small firms, in mounting training programs. And in some situations the benefits to Firm A from its investment in training may be considerably diluted by loss of trained workers to Firms B, C, and D, which perhaps are competitors and incur no training expense. These are problems on which an OTO and an associated levy-grant system can be of considerable assistance (see Chapter 5).

Training by employing establishments, while it has great potential that ought to be better exploited in most countries, also has serious defects. It is not always the most appropriate training approach. For example, in the health field there is a trend among hospitals and other health facilities toward shifting more of their former training activities into educational institutions. This is partly on grounds of costs, partly for greater administrative convenience, and partly on grounds of effectiveness in preparing and presenting some kinds of subject matter. "In health occupations all too often the on-the-job training programs do not receive the feedback which would make them more useful. The instructors may not be adequately provided with time and facilities for preparation and presentation. Although excellent programs exist in many facilities, altogether too often training programs are Scotch-taped together with more regard for the instructor's personal talent or bias than for the student or facility's needs."[2] Major problems are how to find suitable instructors who have a thorough knowledge of the practical and theoretical subject matter and at the same time have or will acquire a real awareness of the most appropriate pedagogical techniques, then to insure that these persons can find preparation time away from other duties.

The ILO study previously quoted (ILO 1967), though it strongly urges that the training potentialities of industrial enterprises be more thoroughly exploited, points to "well-known defects" in the training they give. Referring particularly to training at the skilled-worker level:

> "Even when it is organized systematically it is often too narrow in scope, dividing the skills and knowledge into too many subspecializations, and paying too much attention to learning tricks of the trade rather than to skill training in depth. Instructors often lack pedagogical training; teaching materials are either insufficient or totally lacking. In certain cases the training period is far too long; apprentice training, based on the systems of some of the industrialized countries, may last as long as four or five years. The training given in undertakings also tends to neglect the related theoretical instruction, which is an essential part of the training not only for attaining the level of qualification immediately required, but also as a preparation for any further training and retraining made necessary by technological change. This low level of basic training has repercussions throughout the occupational structure. Foremen and highly skilled workers are of necessity recruited among workers trained by a weak system, and they in turn provide the material from which junior and middle-level technical and managerial staff, including vocational training instructors, are selected. Many large and medium-sized undertakings have tried to remedy this situation, and in some countries they are in fact the sole providers of trained workers with multiple skills; but much remains to be done, particularly in smaller plants and undertakings."

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[2] Letter from Mrs. Barbara Killen, Project Coordinator, Center for Research and Education in Health Occupations, the American Rehabilitation Foundation, Minneapolis, Minnesota, U.S.A.

Training Centers and Collective Training Programs in the Employment System

Training activities based in the employment system but extending beyond the bounds of a single employing establishment will be referred to as "training centers" or "collective training programs" ("training centers" if they are carried on regularly in a special setting, "collective training programs" if they are of a more ad hoc nature). This is to distinguish them from training activities based in institutions of the formal education system, which are referred to as vocational, technical, or other occupationally specialized "schools."[3]

The type of training ranges from formal or semi-formal courses and apprenticeship programs to conventions, conferences, seminars, inplant demonstrations, correspondence courses, and circulation of trade or professional periodicals.

Training centers and collective training programs in various countries have been set up and run by trade associations of employers in a given branch of activity, by labor unions or professional associations, and by organizations of the OTO type which often have a tripartite governing board representing employers, workers, and relevant government departments. Under any of these auspices they are likely to have the merit of being closely attuned to the real demands of the labor market and to current techniques and trade practices.

Training centers and collective training programs in the employment system are most directly relevant to Phases 3 and 4 of our OET model. They are also likely to be able to assist the schools in Phase 2, and even in Phase 1, in connection with instruction in the basics of various families of occupations and general orientation to the world of work. Sometimes, as shown, for example, by the experience of SENA in Colombia, training centers find it necessary to provide remedial education of a general and pre-occupational sort (mathematics, language, science) before their trainees can benefit from the training the center wants to give -- this because of missed educational opportunities or deficiencies in the general education system.

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[3] This follows and carries somewhat further a lead given by the ILO secretariat in the paper on "Education and Training Programmes" in Human Resources for Industrial Development (ILO 1967:70).

Training Centers and Programs of Government Labor and Social Services

In many countries training activities are a part of the operations of ministries of labor, ministries of social affairs, employment services, rehabilitation services, or special government agencies set up to cope with such politically urgent problems as finding opportunities for the educated unemployed or helping underprivileged minorities.

For example, the Ministry of Labor, Employment, and Rehabilitation of the Government of India operates more than three hundred Industrial Training Institutes throughout the country, also a number of Central Training Institutes to prepare instructors. It is embarking upon a program of Rural Training Institutes to increase the competence of service men (bicycle repairers, etc.) in rural areas.[4]

Educative Development Services

In this group are the educative aspects and the training programs of development agencies which, while not primarily devoted to education and training, recognize that in order to achieve their development aims they must improve the occupational competence of people engaged in agriculture, industry, commerce, health work, homemaking, or whatever the field of development may be. Included are:

-- Agricultural extension services. These carry on farm demonstrations, advisory work, clubs for young farm people, radio broadcasts, conferences, and the preparation and circulation of written materials on problems of agriculture and rural homemaking.

-- Industrial extension services, industrial development centers, productivity centers, and small industry or small business programs. These agencies provide management training courses, consulting services, assistance in setting up worker training programs, demonstrations of technological or commercial and managerial improvements, and "coaching" of small enterprisers to help them along the path toward modernization.

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[4] Interview with Col. S. G. Pendse, Director of Training, Directorate General of Employment and Training, in the Ministry. December, 1967.

-- Programs in public health, family planning, and parent education. In these areas education and training activities are central. Among the standard methods are public health educational teams, posters, movies, demonstrations, etc. accompanying mobile clinics, educational work by visiting nurses, well-baby clinics, family planning information programs, and in-service training for practicing physicians, nurses, midwives, and other health personnel.

These educative development services have a triple merit from the OET viewpoint:

First, they are directly linked to projects which seek specific results. Consequently, the education and training tends to be highly motivated, both in the minds of those who teach and those who learn.

Second, they generally reach people who are already committed to an occupational role -- as a farmer, a small or large industrialist, a manager, or a homemaker and parent. What is taught and learned is, therefore, likely to be put to immediate use, not wasted.

Third, the linkage with concrete projects results in combining (or should, if the project is well planned and well managed) the teaching and learning element with other elements required for the particular kind of development being fostered. Thus, good agricultural extension work combines advice to farmers with availability of improved seed, fertilizers, credit, and marketing facilities. Good small-industry development work combines various kinds of advisory and training aid to entrepreneurs with feasibility studies, availability of improved tools and equipment on hire-purchase, marketing information and help, perhaps availability of improved premises in an industrial estate. Combinations like these, if well contrived, produce a synergistic effect -- that is, an effect that is greater than could be expected if each element were introduced separately and the separate effects added up. The whole is greater than the sum of the parts. More will be said later on this fundamental principle of development strategy and its application to OET.

It is obviously in Phases 3 and 4 of our functional scheme, especially Phase 4, that educative development services can make their greatest contribution. They represent an extremely important resource in the repertory of occupational education and training methods and deserve the very serious attention of planners from this point of view.

Military Services

Military services nowadays use highly technical equipment and advanced types of organization and management. Not infrequently in these respects they are among the most "modern" institutions in a country. Like other large employing establishments they require many kinds of qualified personnel. Generally, they give more emphasis to training than most employing establishments -- for various reasons, including their highly specialized activities, their sources of recruits, and the relatively short terms of service of civilian draftees. Much of the training is directed toward imparting knowledge, skills, and personality traits that happen to be applicable also in civilian pursuits and in the furtherance of a country's civilian development programs -- for example, ability to use, maintain, and repair mechanized equipment; technical skills involved in medical and hospital services; ability to plan, organize, and cooperate in complex, large-scale activities.

So long as nations find it necessary to maintain military forces, there is much to be gained by making use of their training capabilities for peaceful development purposes as well as for strictly military ends. This is, in fact, being done in many countries, both highly developed and less developed, and on quite an impressive scale in a few. Hugh Hanning's extensive report on The Peaceful Uses of Military Forces, done for the World Veteran's Federation on the basis of data gathered in sixteen countries, shows that vocational training of servicemen is one of the most widespread and most appreciated of these peaceful uses (Hanning 1967). The two instances that follow are summarized from his study:

Peru. Thousands of conscripts spend their last three months in five vocational centers being trained in carpentry, plumbing, electricity, masonry, or iron work. "It is planned that within the next two years the Army will be discharging semi-skilled workers at the rate of 6,000 to 8,000 a year." (The size of the Peruvian army is around 30,000.) A new departure in 1965 was the establishment of an agricultural training center in the Cuzco area; this trains up to 900 students a year in four cycles of six months each. Subjects include farm equipment operation and maintenance, animal husbandry, fruit and vegetable growing, and food preservation. Instruction concentrates on small farm methods. The center is open to local civilians. Another new center will train operators of road construction equipment. Besides technical training, the army has a campaign to prepare each soldier to become, at the end of his military service, an instructor in his home community in the simpler arts of economic and social development. There is a similar program for literacy instructors, supported by the Ministry of Public Education.

Iran. An Education Corps was set up in 1963 as part of the Shah's six-point rural reform program with its assault on ignorance, poverty, corruption, and landlordism. Some of the secondary school graduates conscripted into the army are enrolled in the Corps as an alternative to standard military service. After four months of training each serves fourteen months as a teacher in a village. His paramount duty is the education of children between the ages of six and twelve who have never previously been to school. "The aim is to bring them up at least to the second grade of primary education and, if possible, as far as the fourth. In addition, he will hold evening classes for adults and encourage them to read on their own by starting small village libraries.... Second only to the spread of literacy are three other major activities: hygiene, farming, and community development." A striking feature of the program has been the response of corpsmen to the Ministry of Education's invitation to stay on as village teachers after their original term of service. "Over 80 per cent of the first consignment applied for teaching positions ... 90 per cent of them in the villages where they had served." It is said that "the combination of a high school education with military discipline turned out to be remarkably strong; in fact, most impartial observers will agree that these instructors are considerably superior to the average run of Iranian teachers, not only in zeal but also in technique." The success of the Education Corps has led to the establishment on similar principles of a Health Corps and an Extension and Development Corps.

Hanning observes that two major reasons may prevent a man who could benefit from vocational training from undertaking it: (1) inconvenience or inaccessibility of the nearest training establishment, and (2) the necessity to postpone the chance to earn a regular wage during the training period. Both these obstacles are overcome by pre-release training of military servicemen.

His study sets forth a number of "General Principles" which will be useful to planners in drawing on military resources for education and training. These are a few:

-- Selection of fields for supplementary training should be made on the basis of national manpower forecasts and plans as to the types of skills to be most needed, combined with assessment of the potentials and numbers of servicemen to be released.

-- Both pre-release and post-release programs are valuable, but for the attainment of primary and middle-level technical skills, the system of pre-release training is more effective and is recommended.

-- A military service training program should aim at the encouragement of post-release continuation of education and training.

-- No program will attain its full potential unless it is accompanied by a placement program for the graduates.

-- A thoroughgoing system must be established for informing the serviceman of what instruction is available, testing his aptitudes and current abilities, counseling him on his opportunities, and providing demonstration of successful results.

-- Particular attention might be paid to the officer and non-commissioned officer personnel, not only for the specialized skills they may possess but also for their continuing potential for leadership following their years of service. Training periods in civilian institutions can increase their service and post-service utility.

Volunteer Services

Private voluntary organizations have been serving their communities for a long time, and some of them have made and continue to make important contributions in the field of OET. Among such organizations are clubs, community centers, neighborhood houses, philanthropic foundations, religious missions, and many others. A new and important development is the government-sponsored or aided volunteer development service.

Governments all over the world have lately shown keen interest in a type of volunteer service organization of which the U.S. Peace Corps is the largest serving internationally and Iran's Education Corps the largest domestically. Since 1958, governments of 55 countries have either established or supported volunteer services, and as of January 1967 approximately 120,000 volunteers financed or aided by governments were working all over the world (Pinkau 1967).

In 1962 a Middle-Level Manpower Conference participated in by 42 countries was held in Puerto Rico. At this meeting the International Secretariat for Volunteer Service (ISVS) was established as an international coordinating and informational center. The ISVS recognizes three fairly distinct types of volunteer service:

-- Export Volunteer Services. These send educated youth abroad to provide technical assistance in newly developing countries. Many volunteers serve as teachers in schools or training centers; others help in agricultural extension, industrial extension, or community development. Some 17,000 were reported in this category as of January 1967, 12,000 from the United States.

-- Domestic Volunteer Services. These also recruit educated youth, but use them within the country on projects of national development. Governments in North and South America, Asia, and Africa support such programs, some of them especially involving university students.

For example, the Haile Selassie University in Ethiopia requires one year of service in rural areas -- mostly in teaching -- before graduation. As of January 1967 there were nearly 30,000 volunteers reported in this category.

-- National Youth Service Programs. These recruit unskilled and undereducated young people and provide them with basic education and skill training for service within their own countries on projects of national development. Many African countries have such programs, mostly emphasizing modern agriculture, land settlement, community development, and construction of public works. About 71,000 were reported in this category as of January 1967.[5]

As Irene Pinkau says in the paper from which these data come and on which most of the discussion here is based, "All of these programs are two-way streets; the volunteer increases his knowledge, skills, and understanding for the needs of social-economic development, and he invests his skills, knowledge, and experience and involvement as human capital in the work program," which often includes teaching others. The volunteer often acquires or improves his own occupational skills and may help others to do so.

For example, Iran's Education Corps gives properly qualified members the opportunity to continue as permanent teachers in villages after completion of their volunteer tour of duty, and they then receive additional training. "The service is structured as a teachers' education system and affords the single qualified person a chance to continue on to higher jobs. As of this writing 8,700 members of the Education Corps are teaching, but the Corps has already sent out 12,500 permanent teachers into the villages."

The various National Youth Services devote an important part of their programs to general education, physical education, and civic training for their volunteers, in fields such as literacy, hygiene and health, citizenship, and youth leadership techniques. "These training programs are functional and job oriented, relating to the work programs in which the volunteers will be participating. An analysis of the educational background of the volunteers shows that 15 to 25% of them have had no schooling and from 25 to 50% have had only five years of schooling.... In these cases the volunteer service program meets the need for general education and literacy outside of the regular school system.

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[5] The totals reported in the three categories do not add to the 120,000 world estimate given earlier because the world total includes an allowance for nonreporting areas.

This role is very important in those countries where the population explosion has resulted in more than 60% of the population being youth under 15 years of age and where it is economically impossible for a country's school system to meet the problem."

The following examples and comments by Dr. Pinkau are very relevant to certain lines of thought advanced in this study:

> "The Kenya Youth Service ... provides 50 full days, the Malawi Young Pioneers 76 full days of training in programs of general education.... Added to the time spent in vocational training, the partcipant in Kenya receives 200 days' training and in Malawi 240 days ... equivalent in each case to about a full year of school.
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> "The advantage of combining vocational training and general education is that neither is taught in isolation. The volunteers use their new knowledge and skills immediately in work programs. This approach minimizes the danger of secondary illiteracy which results when people have no chance to use their new knowledge and, therefore, have no incentive to put forth their best efforts. In this type of program the relationship between education and training, on the one hand, and the opportunity to use the new knowledge and new skills, on the other, (is) ... direct and immediate.
>
> "Unlike the formal education system, the volunteer service organizations can be flexible and innovative in meeting the needs of the participant. They do not have to deal with many of the interstructural and administration problems that the classical school systems may face. Volunteer program costs are also lower because there is less investment in buildings and equipment.
>
> "But, of course, there are also some limitations. Volunteer services are no substitute for an adequate school system. There are no clear guidelines or objective studies of the quality and effectiveness of this type of education. However, because of their flexibility, because of their job-orientation and lower costs, volunteer educational programs can expand rapidly and can help to close the gap in the field of job-oriented education."

It is evident from the foregoing that volunteer services can contribute in different ways to each of the four phases of our OET model: to general education, to pre-occupational education, to job-entry training and further education, and to further training and further education of persons already working.

Communication Organizations

Modern communication media have taught so many of the people of newly developing countries to want that it is essential now to enlist these same powerful media in teaching them to produce.[6] To this end, communication organizations must help to build occupational competence in farming, industry, services, administration and management, homemaking and parenthood, and all the other specialized activities required in a productive modern society.

Enlistment of the communication media in building occupational competence is likely to be most effective when it takes the form of alliances between the media people on the one hand and, on the other, one or more of the various types of institutions already discussed which have OET messages to get across. Educative development services, training centers, employing establishments, and many levels and types of schools have worthwhile informational and instructional materials which could beneficially be given a wider audience and perhaps a more effective presentation with the cooperation of professional communicators.

The principal types of communication organizations that need to be considered and brought into cooperation for OET purposes are:

-- Radio, television, and films. Both their regular information and entertainment services addressed to the general public and special-purpose applications specifically designed for education and training are relevant.

-- Press and publishing. Newspapers, magazines, professional journals, and books are essential tools of occupational information, education, and training.

-- Libraries, museums, fairs, exhibitions. The development and utilization of these channels is another important aspect of communicating occupational knowledge, skills, and attitudes.

How best to make use of these modern communication possibilities for conveying to many sorts of people the messages that will enable them to do their jobs better is in itself a tremendous topic which cannot be treated here. It would seem, however, that enlistment of experts in the field to consider specifically the possible applications of various communication techniques in giving OET wider outreach and greater impact and in improving cost-effectiveness ratios ought to be rewarding.

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[6] See the concluding chapter by Daniel Lerner in Lerner and Schramm (eds.), 1967, and a review of that book by Teruji Sakiayama in Productivity Digest, organ of the Asian Productivity Organization, September, 1967.

Correspondence Schools

Finally, it is desirable to put on our list of institutions to be utilized in an OET system one that overlaps with many others already mentioned: the correspondence school. The method of instruction by correspondence is part of the armory of many standard education institutions. It is widely used by extension departments of universities. But also there are in some countries flourishing independent institutions which concentrate on this technique.

For example, a significant amount of technical instruction is provided in the United States by correspondence schools. There were in 1960 some 300 private correspondence schools with an estimated enrollment of about one million. Another 175,000 students were enrolled in correspondence courses given by university extension divisions. About 5,000 business firms had contracts through which their employees might take at company expense either regular correspondence courses or specially developed ones. The larger correspondence schools are able to offer a great variety of courses, thus supplementing the more limited offerings of the regular schools in localities all over the country. "A typical vocational-technical course, in radio or television repair, for instance, consists of 75 to 100 lessons, each based on a booklet of more than fifty pages and requiring about fifteen hours of work by the student. To pass the course the student must complete a written assignment on each lesson, which is sent to the school for grading and comment. The graduates of reputable schools seem to have considerable ambition and self-discipline, and the ability to read with understanding and to express themselves clearly in writing" (David, ed., 1960:175-6).

UTILIZING AND "ORCHESTRATING" ALL RESOURCES

The preceding review has shown that many institutional devices and resources are available -- at least potentially -- to aid in the tasks of preparing qualified personnel for the occupational roles necessary in development. The OET planner has to make the best possible use of those that are most available in his country and most suited to its needs. This requires a thoughtful, comprehensive strategy -- an "orchestration" of all resources for coping with problems of manpower and human resource development -- not separate, uncoordinated efforts by the education authorities, the labor ministry, the subject-matter agencies (agriculture, industry, health, etc.), the employing establishments, and voluntary groups.

After surveying education and training problems related to industrial development a recent ILO study concludes that, "Developing countries pay a high price for meagre results." In many cases the inadequacies and inefficiencies do not arise from insufficient recognition of the role of human resources in the development process. "Indeed, it is possible that, from the beginning of the present decade, which has seen extensive acknowledgement given to the economic value of human resources, some countries have been too eager to invest in people, without having an over-all view of the problem and, in particular, of the criteria which would enable them to assess the costs and benefits of such investment. The crucial point seems to be the lack of a coherent policy, specifying the tasks of the various bodies concerned in training with a view to meeting carefully determined needs at the lowest possible cost." (ILO 1967:61-62. Emphasis supplied.)

What is necessary, in the words of the ILO study, is "an integrated system," a "systematic deployment of all available resources for the effective education and timely training of the personnel required." Frederick Harbison has trenchantly advocated a systems analysis concept:

> "It should be possible to look at the various constituent elements of human resource development as a system which is somewhat analogous to a system for the generation and distribution of electric power. In using this frame of reference, one can identify skill generating centers, such as for example schools, universities, training institutes, and employing organizations, which develop people on the job. The linkages between such centers are analogous to transmission lines. The manpower problems encountered by developing countries such as skill shortages and labor surpluses may be thought of as attributable to power failures in particular generating centers, ineffective linkages between these centers, or faulty design resulting in the failure of the total system to carry the loads expected of it. A system of human skill generation, like a system of electric power generation, should be designed to carry varying loads; it must have built-in flexibility to meet such loads; it must be adequate in size; and above all its components must be properly balanced. The systems analysis approach makes it easier to identify in operational terms major problem areas, and it compels the analyst to examine the critical interrelationships between various manpower, education, and economic development programs. It provides a logical starting point for building a strategy of human resource development." (Harbison 1966.)

Allocation of Responsibility

The basic allocation of institutional responsibility proposed in this book rests on the distinction already drawn between education and training. Education should be primarily the responsibility of the regular education system (school system); training should be primarily the responsibility of the employment system, including employing establishments and organizations of employers, workers, or government closely identified with production and employment. Both the school system and the employment system should recognize secondary responsibilities for close cooperation with and assistance to each other. Furthermore, institutions which are not closely identified either with the school system or the employment system -- military services, volunteer services, communication organizations, correspondence schools -- should be encouraged to assist in the OET tasks of both, wherever they can do so effectively.

Linkages

To bring all potential institutional resources to bear and to orchestrate them effectively in a combined attack on OET problems is no easy task. Perhaps the key element in progress toward this goal is linkage -- habits of work and institutional devices which facilitate continuous intercommunication and mutual assistance among the various groups that can contribute. Two sorts of linkage are particularly important: (1) linkage between the schools and the employment system, and (2) linkage between OET programs or projects and specific development programs or projects.

The first can be facilitated by some type of over-all organization which brings together representatives of the school system and of employers, workers, and development agencies. But over-all organization is only a facilitator. The real "action" that can make linkage effective has to extend far beyond high-level board meetings. The intention to communicate and cooperate must be implemented at national, provincial, and local levels and must permeate the everyday thinking of school principals and teachers, industrial managers and personnel officers, administrators of government departments and civil service authorities, and leaders in training centers, educative services, and all the other institutions that may be able to make a significant contribution to the development of improved occupational competence.

K. N. Rao, discussing occupational education and training in Latin America particularly, emphasizes the crucial need to refashion curricula. "The educational and training institutions still function in a vacuum away from industry." Development of closer ties has to be sought, he suggests, through such means as:

-- advisory committees

-- placement and follow-up of graduates

-- involvement of industry in the revision of curricula

-- development of summer and cooperative programs with industry

-- industrial experiences for old and new teachers

-- special clinics for industry

-- conferences of technical teachers and employers

The second sort of linkage -- that between OET programs or projects and specific development programs or projects -- also requires continuous intercommunication and collaboration, from high planning levels down to local levels of implementation. Too often development programs -- from great irrigation and electricity works to factories and schools -- have been planned with meticulous attention to requirements for finance, equipment, and physical ingredients like cement and steel but with comparatively little forethought about either (1) the qualified personnel requirements to establish the program or project and to keep it operating, or (2) the additional requirements of qualified personnel that will be necessary to make good use of the output of the new facility (for example, skilled electricians if a great hydro-electric development doubles the availability of electric power, or better-trained farmers to make constructive use of the production of new fertilizer factories).

As hinted earlier, this touches on a fundamental principle of development -- the principle of synergy or combinations and interactions of mutually reinforcing factors. (See for discussion of this principle and applications to development strategy, Staley 1966.)

The general principle can be illustrated by a specific example from agriculture. Experiments in northeast India with corn (maize) showed that yields of about 25 bushels to the acre could be expected when using traditional practices. When a single modification of these practices was introduced -- substituting improved seed (an adapted hybrid) for the local seed -- the yield did increase, but only to about 28 bushels per acre, which was hardly enough to justify the trouble and expense. Keeping the local seed, but introducing another single modification, such as fertilizer, or proper water control, had a roughly similar result -- some increase in yield, but not enough to be very rewarding. However, when a combination of properly selected modifications was introduced (hybrid seed, together with water and fertilizer) the yield increased explosively, to around 100 bushels. Single improvements, in the absence of some of the other factors needed to make them really effective, were unrewarding, but a suitably integrated combination of factors was very rewarding.

The principle clearly applies to OET planning, in two ways. First, a properly selected combination of improvements in OET institutions and methods is likely to be more rewarding than merely altering one part of what should be an integrated and mutually reinforcing system for human resource development and utilization. For example, if a change were to be brought about in school curricula along lines suggested in this study, while hiring and training practices in the employment system remained backward, the result might not be very worthwhile -- and the converse is also probably true. But the two kinds of improvements together, mutually reinforcing, would be much more potent. Second, OET programs will be fully effective and most rewarding as investments when they are closely linked to developments in fields that need and will utilize the qualified personnel to be produced, that is, to developments in agriculture, manufacturing, transportation, health services, and so on. Conversely, development programs and projects in these fields will be less productive than they should be if they are planned and carried through without corresponding OET developments.

TWO PROBLEMS OF POLICY

Discussion of two broad and interrelated policy problems involving institutional choices will conclude this chapter. The first is the choice between "comprehensive" (also called "composite" or "multipurpose") schools and a dual system in which there are two sets of schools, one providing an academic or general education and the other vocationally oriented education. This issue will be considered first at the secondary level and then at the level of post-secondary college and university education. The second is the issue of the appropriate institutional auspices for training (as distinguished from education). Is it better to provide training in schools (that is, in institutions run by the regular education system) or in employing establishments and centers (that is, institutions run by or closely allied with the employment system)? In case the decision is to emphasize the latter, what can be the future role of existing vocational schools?

Comprehensive or Occupationally Specialized Schools? Secondary Level

A key issue that OET planners in newly developing countries must confront is one that has lately been a center of controversy and the subject of reform movements in many countries. Which of two patterns for developing the secondary school system is better?

1. The dual system. Two sets of secondary schools are provided. One set has an academic or general orientation designed for students who will go on to university and thence to professional, administrative, or managerial careers. The other has an occupational (vocational) orientation leading mainly to manual occupations or possibly to submanagerial or subprofessional (technical) employments.

2. The comprehensive system. A single set of comprehensive secondary schools serves both those youngsters who are probably headed for early employment and those probably headed for university. There is no sharp distinction between the two groups, in fact no firm identification of them in the earlier years. Both share in a common school experience. Both receive a common core of general education and participate together in extracurricular activities. Gradually, on the basis of demonstrated aptitudes and interests, students are guided individually into "channels" or "streams" which have different emphases (for example: pretechnological, agricultural, commercial, homemaking, health occupations, university preparatory). Opportunities for crossover from one channel to another remain open.

The first is the older system. It prevailed in Europe until recently but is now in retreat there. Through example and colonial policy it spread to many of the newly developing countries. The second system has historically been most prominent in the United States and is generally favored by American educational philosophers and policy makers. Policy in such European countries as Sweden and Britain has veered toward it in recent decades.

The position taken in this study is that newly developing countries will be well advised to avoid any solidification of the dual system and to set their sights toward comprehensive secondary schools. Here are the reasons:

-- On democratic grounds. Experience shows that when children are steered at the age of eleven or so into separate academically-oriented and vocationally oriented schools, the selection is heavily influenced by class background. The economic, social, and political status of the family generally plays a decisive role. Even where objective tests are used, the test results reflect opportunities or deprivations in the home. The dual system of education thus tends to perpetuate class distinctions and inequalities of opportunity and to limit social and occupational mobility. It restricts both the rise of talented people from the lower strata and the fall of less talented ones from the higher strata.

-- On child development grounds. At the age of entry into secondary school it is premature to commit a child to a certain range of occupational choices and preclude others by the nature of his schooling. Occupational commitment should be postponed to a later stage. Meanwhile the educational program should be a broad one designed to discover and develop latent aptitudes and interests. Even at later stages, after a start in a particular direction, there should always be crossover possibilities, made real by individual counseling. Such shifts in program are more likely to be feasible in a comprehensive school.

-- On grounds of best use of human resources. Perpetuation of differences in class status and in home opportunities deprives society of latent talent which goes undiscovered and undeveloped. On the other hand, school policies which encourage the development of individual talent from whatever social source toward any type of occupation for which the individual shows aptitude are powerful means of developing to the full the human resources on which modern development critically depends.

-- On grounds of educational efficiency and cost. In some countries vocational schools and academically oriented schools are separately administered, with the wasteful result that in the same town a school of one type may be underoccupied and overstaffed while a neighboring school of the other type is overcrowded and understaffed. Consolidation into a comprehensive school would permit lower costs per pupil by enabling more efficient utilization of instructors, buildings, equipment, and materials.

-- On grounds of educational content. All students, including those who go on to university and professional or managerial careers, should receive some exposure to industrial arts or manual skills in the form of shop courses. Likewise, all students, including those likely to be manual workers, should have a basic general education that includes the development of communication skills, humanistic studies, elementary natural and social science, and development of attitudes that make for effective performance as producers, citizens, and persons. The comprehensive or multi-channel school can more readily provide these broadening educational experiences. Also, the common participation of youngsters from various social backgrounds in school games and other extracurricular activities as well as in classrooms and laboratories is itself a valuable educational experience from the standpoint of democratic development.

There are, however, arguments on the other side. One vocational educator with much experience in international technical assistance has written: "While the comprehensive high school might be an excellent form in the American educational technology, it seems to be more ideally suited for the highly developed American industrial metropolis than to the village-dispersed populations of underdeveloped countries. The comprehensive high school also requires a sophisticated instructional organization and teaching force, and a leadership with an exceptionally well-balanced philosophy of education. These are lacking at the present time in most developing countries." (Rao 1962.)

Probably the arguments in favor of the comprehensive as against the dual system of education weigh more heavily at the lower secondary level (junior high school, ages about 11-14) than at the upper secondary level (senior high school, ages about 15-18). Many young people, especially in newly developing countries, have to go to work at age 15 or earlier. While the long-range goal should undoubtedly be to keep nearly all in school through the upper secondary level, as is happening in the affluent countries, this is not a near-term possibility for most newly developing countries.

There is, therefore, an important role for training of various kinds at the upper secondary level provided the training can be intimately tied in with industry and commerce. The main functions of vocational schools at this level should be to provide part-time instruction for employed youths and adults who are also learning on the job. By "sandwich" or "block-release" arrangements or in evening hours these employed people would receive additional vocational instruction and further general education in teaching-workshops, classrooms, and laboratories.

Comprehensive or Occupational Specialized Schools? Post-Secondary and University Level

Occupations classified as professional -- such as those of the engineer, the architect, the industrial economist, the research scientist, or the university professor -- have the common characteristic that they require relatively broad knowledge, mastery of a complex subject matter, and ability to manipulate and apply rather abstract ideas and principles. Therefore, professionals require a good general education well into or through the university level. They also need pre-occupational education which gives them thorough familiarity with the basic theoretical structures and operational skills of the field in which they plan to work. On top of all this they need training for specific, specialized tasks.

For subprofessionals -- such as draftsmen, statistical assistants, electrical technicians, nurses, and medical aids -- a fairly good level of theoretical understanding is also required, though neither so broad nor so thoroughgoing as that of the professionals. Necessary operational skills often include a considerable mechanical element. The desirable general education level is at least upper secondary, topped off or followed by pre-occupational education which provides a systematic background of theory and skills focused on the chosen area of specialization. Specific training can take place to some extent along with this last stage and further at job entry and subsequently.

Because professionals and subprofessionals need considerably more theoretical understanding than do skilled workmen and also more skill in language, mathematics, and other general fields, a higher proportion of their total preparation is appropriately carried on in education and training institutions rather than on the job.

What about the issue of comprehensive versus separate, occupationally specialized institutions for the preparation of professionals and subprofessionals? Here, too, at the post-secondary and university level as well as in secondary education, the trend of practice and of expert opinion seems to be toward the comprehensive side. That is, toward universities (or "multiversities") embodying professional schools and toward junior colleges embodying vocational programs for subprofessionals, rather than toward completely independent professional schools, technical institutes, and the like.

For example, in the United States some decades ago many separate institutions called "normal schools" existed to train teachers for the primary and secondary schools, but nowadays it is felt that teachers can be better prepared on the same campus with faculty and students of the social, physical, and biological sciences and the humanities. The best teacher education (not mere training in methods) requires stimulating contact with the constantly growing body of knowledge outside the school for teachers as well as in it. Knowledge broadly pertinent to the teachers' functions is needed from departments of psychology, anthropology, economics, history, etc. and deepening is needed in whatever substantive field the teacher may teach, such as chemistry or art. Faculty strength and stimulating student contacts related to these needs for broadening and deepening is more readily attainable where the professional or subprofessional school or faculty or department constitutes one unit within the framework of a general university or college.

Also, there are opportunities for greater efficiency and economy if basic courses needed in several occupationally specialized programs can be provided jointly. These opportunities exist where the occupationally specialized instruction takes place within a university or college framework. For example, elementary and advanced chemistry can be offered as part of the institution's general studies program rather than separately in schools of medicine, engineering, industrial economics, etc., and the same goes for widely needed tool courses in mathematics, statistics, computer programming, languages, and so on. However, the existence of these opportunities does not always mean that they will be utilized, even within the framework of what is nominally one university. In Latin American universities, for example, the separate "faculties" have characteristically been so independent from each other, and so jealous of their separate sovereignties, that joint student programs and sharing of instructors and laboratories are inhibited; there can literally be half a dozen or more inadequate courses in elementary chemistry in as many different faculties rather than one or two good ones shared by all. This is now changing in Latin America under the leadership of a number of progressive universities which have pioneered in general studies programs along with other reforms.

Engineering schools, business schools, schools for nurses, teachers, technicians, and so on -- whether they function as units within a broader university or college framework or as separate institutions -- should develop close links with that part of the employment system which they serve. Students should be given practical problems to solve, as nearly as possible like those they will confront later in their jobs. Where feasible, internships and part-time employment should be arranged. Professors should be encouraged to do a reasonable amount of consulting work in their special fields, so as to keep in close touch with current needs and new methods. Thus, they will be able to bring realistic problems to their students and also be in a better position to advise them on career choices and to help them locate suitable jobs.

The employing organization which hires a new professional or subprofessional also should recognize certain responsibilities. One is to provide a well-planned period of induction training. No matter how good the professional preparation of the recruit, he and the organization he works for will benefit from a thoughtful program to acquaint him systematically with the particular aims, problems, and working methods of the group that he has joined. Also, professionals and subprofessionals need repeated opportunities throughout their working careers for participation in professional conferences and seminars, for refresher and upgrading courses and for other means of increasing their competences and keeping up to date. Here is an area for close cooperation with universities, colleges, and occupationally specialized education and training institutions.

The late Homi J. Bhabha, when head of the Atomic Energy Department of the Government in India, developed a system of in-employment training for scientists and technologists which illustrates what a large employing organization under imaginative leadership can do. The Atomic Energy Department recruited from universities all over India, endeavoring to choose the most promising, well-prepared people. They put the recruits into a one-year training course at their own special school and then into on-the-job training. The trainees worked in groups with more experienced people, and after about three or four years they were useful scientists and technologists who could be relied on. The staff of some five thousand in the Atomic Energy establishment, said Bahbha in an interview, was not obtained by pilfering from other government departments or the universities. "We recruit only about 300 persons per year, while there are many hundreds of others whom the departments can recruit and give similar training. So we're not depleting, so to speak, the reservoir of trained scientific manpower." (Bhabha 1963.)

Training in Schools or in Centers and Establishments?

The education system is in a better position than the employment system to perform certain kinds of functions in occupational preparation. Among them are provision of basic knowledge and skills applicable in many kinds of jobs and adaptable to instruction in classrooms, school laboratories, and teaching workshops without excessively expensive or specialized equipment. This is general and pre-occupational education. When it comes to highly specific training, and even more for provision of realistic work experience, the disadvantages of schools usually exceed their advantages.

Employing establishments, on the other hand, are better able to give realistic experience in a working environment, to provide the practical aspects of training for specific jobs, and to provide opportunities for learning from demonstration and by practice with real production equipment under the tutelage of men thoroughly versed in current production techniques. At the same time, serious deficiencies characterize training by employing establishments, especially on the side of underlying theory.

A combined system that draws on the strengths of both the school system and the employment system is, therefore, essential for best results in occupational education and training.

One approach is that of Sweden, which has developed an effective system of factory-school cooperation. As reported by Lady Gertrude Williams in her study of Apprenticeship in Europe (Williams 1963:148, 156): There are over 600 municipal vocational training schools in Sweden which give both practical and theoretical instruction. The pupils then go into industry, but for a further year they are considered as trainees, before they qualify for the full adult wage. In recent years many industrial enterprises have gone into partnership with the vocational schools. If a firm wishes to start a school for apprentices but cannot provide the theoretical part of the training, it arranges with a vocational school to do this -- a practice called the "built-in school." The firm gives practical instruction for 34 hours a week and the school the theoretical part for 8 hours. The apprentices are formally under the supervision of a headmaster of a school throughout the whole week. At present, out of 140,000 pupils registered in the municipal vocational schools, only 40,000 are full time; the rest are in "built-in schools."

There are many other possibilities for "work-study" programs and "sandwich courses" involving alternation for short or long periods between a school or an institutionalized training center and an employing establishment. Other widely used techniques which help to combine the advantages of school learning with learning on the job are evening courses or late afternoon or other part-time courses for employed workers, correspondence courses, radio-TV courses, and special seminars, conferences, and demonstrations by experts from industry or from educational and research institutions or from educative services such as productivity centers and agricultural extension services.

Schools (run by the regular education system) are not the only organizations to provide the institutional component of training. There are also training centers (in the sense defined earlier: run by or closely allied with some part of the employment system rather than the education system). Are there general grounds for preferring schools to centers, or the reverse, when institutionalized training rather than education is being planned?

Probably the better policy in most cases is to look toward centers for training and schools for education (including the further education that should be associated with training). The main reason is that institutions directly controlled by or closely associated with employers, workers' organizations, and agencies that serve them are more likely than education ministries to have a realistic view of training needs, to have access to the right kinds of personnel and equipment, to be able to pay the salaries necessary to compete for men with industrial or other work experience, to be free from the dead-hand of outmoded examination systems, and to be able to put successful students in touch with opportunities for initial employment or advancement in the line for which they are trained.

However, it must be added immediately that these general observations will not be everywhere true. In determining whether schools or centers should be the instruments of the institutional component in training, much will depend on traditions, administrative problems, financing possibilities, even personal attitudes of key individuals both in the school system and the employment system. These will differ not only from country to country but perhaps from place to place within the same country and very likely from one industry to another or as between, say, industry, agriculture, and public administration.

In Sweden, as just noted, a very close relationship has been worked out between municipally sponsored vocational schools and industry. Apparently this is working well in Sweden, and some similar approach may be promising in other countries where the environment is suitable. In Latin America, which is probably more typical for newly developing countries, a North American expert intimately familiar with efforts to develop occupational training finds that United States aid to vocational schools has been less productive than ILO aid for the establishment of national manpower training organizations which operate training centers. The reasons, as analyzed by Joshua M. Levine, include a number of factors likely to be present in some newly developing countries outside Latin America, as well as in Latin America. The following is a summary of his observations (Levine 1967):

The usual pattern of U.S. aid for occupational training in Latin America has been to help develop, under the supervision of the ministry of education, vocational schools modeled on those common in the United States. "Here is a classic example of an institution deliberately copied from one culture without a full examination of its function in another." A different pattern of skill development in Latin America is the emergence of national manpower training institutions, established largely with ILO technical and financial assistance, in which European experience has been the predominant influence. These generally share certain common features (though not universally): They are supported by a payroll tax; they are independent of either the ministry of education or the ministry of labor but have representatives from both on a tripartite governing body representing employers, workers, and government; they are run by a director with considerable independence of action; they are dedicated to a highly flexible approach to training needs; and they are also responsible for upgrading the skills of the already employed.

The cycle of experience with the U.S. aid efforts to vocational schools "can be observed in almost any Latin American country and is almost universally the same: A heavy investment of technicians and funds was initially effective but deteriorated substantially when AID support was ultimately withdrawn." In Nicaragua the vocational school project has created space and equipment for 160 graduates annually, but only 60 graduated in 1966, ten years after the school started. In Paraguay after about the same period the number of graduates could be upwards of 120 but it has never been higher than 67 and is declining. "After the substantial initial efforts of both AID and the national government, the continuing effort cost Paraguay about 5% of its annual budget for education and about 50% of its secondary school budget," though the vocational school output was 67 as compared with the general secondary output of about 2,500.

In strong contrast is "the sense of vitality and purpose which pervades" the national manpower training agencies. "Their leadership is characteristically young, dynamic, and innovational. Errors have been made, and the tasks of more training, better training, and more efficient training are still formidable, but the prognosis is clearly positive.... The contrast with the formal school system is unavoidable."

What are the reasons? Mr. Levine answers:

Flexibility. Development puts changing demands on job content; it is both difficult and expensive to change job training, particularly for a ministry of education. The school systems of Latin America have long been concerned with a heritage of education for an intellectual elite, and they move away from it slowly and with difficulty. The training institution has no such problem. "If some jobs require only two weeks of lectures or demonstrations, that is the response given by the training agency. If some jobs require a three-year sandwich of job experience and classroom work, that is the response of the training agency.... And if last year's need for diesel engine mechanics is replaced by this year's need for draftsmen, the training agency is able to stop one course and begin the other."

Costs and efficiency. A minister of education, faced with overwhelming demands, limited funds, and the high costs of vocational training in the secondary schools (variously estimated at from 3 to 5 times that of academic education) often must cut expenses to such a degree that vocational schools are unable to compete with industry for competent instructors or provide the necessary equipment and instructional materials. The ultimate result is poor instruction, badly trained graduates, and rejection of graduates by employers. Diversion from general education of whatever funds are spent on vocational training may also mean that general education is not what it should be. "By contrast, the quasi-autonomous training institution, with an assured source of funds, can successfully compete for teachers and can readily equate its equipment and instructional materials with those of industry.... Moreover, the training agencies concentrate on training in the context of an existing employer-employee relationship. This reduces to a minimum the kind of loss involved when a trainee does not work at the job for which he trained."

Differences in the product. "Vocational school graduates are less than enthusiastically welcomed by industry," even when the instruction is of high quality. The reasons are complex, but "perhaps the most common thread is that the student regards himself as an 'educated man.'" He has been educated out of context, not trained in the realities of the world of work, regards himself as superior to workers already employed, demands a supervisory position and higher pay, and is disgruntled if he does not get them. On the other hand, the autonomous training institution trains within the context of the work situation by upgrading the skill of workers already employed, by training new workers through apprenticeship, or by training work supervisors to do their own training. It creates no false hopes in the trainees and trains only in relation to the work to be done.

Differences in who is trained. "Finally," says Mr. Levine, "vocational schools in Latin America train the wrong students." The proportion of youngsters who get as far as secondary school, where most vocational education is provided, is very small. "The vast bulk of the potential industrial labor force has already left the system." The survivors are likely to be those more responsive to academic or intellectual interests than to the training for manual pursuits which is the mainstay of the vocational schools. There is evidence that many of the students enrolled in vocational schools are there simply because places were not available in general secondary schools.

Mr. Levine concludes with the caution that

> "both the general failure of the formal school approach and the general success of the quasi-autonomous agency approach need to be qualified. In some communities, a happy combination of high-quality technical assistance and a dedicated local national school director and staff have merged to make the vocational school a success, at least for a few years. But these are events which could not outlast the negative effects of the system itself. On the other side of the coin, the training agencies have not always used their funds, their flexibility, and their autonomy to the maximum."

But:

> "The fact that an occasional vocational school has temporarily succeeded and that the training agencies have defects does not, however, seriously modify the institutional choice. The course for the development planner seems clear: the formal school system to the task of general education; the quasi-autonomous training agency for specific occupational training. No institution other than the school can take on the job of general education, but there are many other sources for skill development."

The Role of Vocational Secondary Schools

Levine's strictures are by no means unique. The widespread assumption, acted upon in many newly developing countries, that the way to produce skilled workers is to set up vocational secondary schools and give pre-employment training has come under strong criticism by observers in parts of the world other than Latin America. A paper by Philip J. Foster, written with special reference to Ghana and neighboring areas in West Africa, bears the significant title: "The Vocational School Fallacy in Development Planning." (In Anderson and Bowman, eds., 1965:142-166.) One of Foster's theses is that,

> "... a great deal of training must be developed outside the schools through the use of auxiliary institutions, with special vocational institutes being created in particular cases where their endeavors can be closely meshed with on-the-job training and with the actual manpower requirements indicated by the market for skills."

Various kinds of vocational training can be inaugurated, he says,

> "... without, at the same time, forcing vocational education into the formal school structure or providing massive developments in the form of specific technical and vocational schools for full-time pupils. To be sure, such institutions must play a role in development but their number should be expanded carefully; they should be associated closely with actual developments in the economy through the provision of 'sandwich' and short courses, and their clientele should be largely individuals who are actually employed. So far as possible, the burdens of vocational training should be shifted to those groups who are actually demanding skilled labor of various types....
>
> "... Given more limited objectives the schools can make a significant contribution to development of technical competence by turning out pupils able to absorb and utilize effectively specific forms of vocational training."

One important consideration in appraising the role of vocational schools is their very high cost. Vocational schools are several times more costly per pupil than schools devoted to general education, largely because of equipment expense and the smaller pupil-teacher ratio necessary in shop courses. When account is taken of dropouts and of those who do not enter occupations for which they were trained, the cost per trained person finally made available to the employment system can be very high indeed. This situation has inspired critical questions: Does vocational schooling result in sufficiently superior job performance and earnings to justify the extra cost? Might there be greater gain from some alternative plan in which additional schooling of a more general character would be emphasized instead of the relatively expensive vocational schooling, while some of the saving so effected would be devoted to subsidizing training in employment? Carefully sifted data bearing on these issues are not nearly as abundant as they should be, in view of the important policy problems and the expenditures of scarce educational funds involved. But there is some evidence from scattered sources:

-- In Worcester, Massachusetts, U.S.A., it was found that the public costs of vocational schooling were 2.3 times the corresponding costs of general schooling. Among workers in local manufacturing plants, a comparison of the wages received by vocational school graduates and general school graduates, respectively, shortly after employment revealed that the vocational school graduates got on the average about 5 per cent more. However, five years later the wages of the general graduates had moved up just as well as those of the vocational graduates. Might it not be better, the author of the study asked, instead of spending so much on vocational schools, to use equivalent funds to encourage more on-the-job training? (Corazzini 1966:38-56, 112-113, 116.)

-- In Switzerland it has been calculated that, in addition to the cost of buildings and equipment, the running expenses of full time training in vocational schools are five times as much as training on the job (Williams 1963:75-76).

-- The Royal Netherlands Steel Works finds that apprentices it accepts from grammar schools, where they have had no preliminary technical training, take no more than three months to reach the same technical level as those from the vocational schools (where children go at about age 12 after finishing primary education). (Williams 1963:75-76.)

-- In Jordan, the cost of producing a graduate of an industrial secondary school is estimated at 4.8 times that of producing a graduate of a general secondary school (Al-Bukhari 1968a:160).

In Tunisia, a similar reckoning of the costs per graduate from the industrial sections of the secondary schools as compared with the general sections yielded a ratio of 2 to 1 (Al-Bukhari 1968b:Chart 6-2, p. 100).

The policy approach which deserves to be most generally recommended to newly developing countries, in the light of experience and evidence presently available and in line with principles advocated in this study, would seem to be the following:

The functions that vocational secondary schools are usually designed to perform should be divided between two types of institutions: comprehensive secondary schools having good programs of pre-occupational education and training centers closely linked to the employment system. The training centers should also cooperate with the schools, giving help on pre-occupational education and receiving it on the further education that should be associated with training. The centers should serve especially: (1) youths in their first regular employment or with "sponsorship" of a potential employer, and (2) adult workers, for upgrading, renewal, and transfer training along with further education.

What can be done where there is already a considerable investment in vocational secondary schools? The most promising avenues for future utilization of their facilities and staffs are likely to be the following four: (1) Affiliate some of the schools closely with the employment system, and use the equipment and instructors for the institutional portions of a combined in-plant and institutional training program. In other words, convert them into training centers. (2) Convert some vocational schools into comprehensive secondary schools, using their equipment and instructors in the pre-occupational education program of the comprehensive school. (3) Convert some into "area vocational schools" serving as adjuncts to more than one general secondary school and thus strengthening the pre-occupational programs of these schools. (4) Upgrade some vocational schools from the secondary to the post-secondary level for technician training. There is a stronger case for occupationally specialized schools at this level, though even here there are advantages, noted earlier, in having such a school be a unit in a "comprehensive" college.

CHAPTER 5

ORGANIZATIONAL CHOICES

One of the central themes of this study is that training of persons at the point of entry into employment and subsequently throughout their working careers (Phases 3 and 4 in our phased model of OET functions) deserves considerably more attention and emphasis than is now given to it in most countries. But it is unlikely to get this attention and emphasis until there is some organizational mechanism explicitly charged with planning and implementing occupational training programs and provided with necessary authority and financial means to enlist the cooperation of the various kinds of institutions that can help.

All countries have organizational mechanisms of some sort (usually ministries of education) for planning and administering the regular education system. But relatively few have any organized way of seeing to it that employing establishments throw their full weight into the task of training qualified personnel to meet their own needs and to promote the country's development. Nor is there usually any organized way of promoting desirable linkages between the employment system and the education system so that each will aid the other in their particular responsibilities for OET. Likewise lacking, in the usual case, are organized means for joint planning and for enlisting mutually reinforcing efforts of the education system and employing establishments and also of the numerous other institutions in what we have called the second education system: training centers, agricultural and industrial extension services, military services, volunteer services, communication organizations, and correspondence schools.

What is needed is some type of occupational training organization, to be referred to below as an OTO.

Organizational Patterns

Circumstances vary so much from country to country that it would be a mistake to suggest any universal pattern of organization for an OTO. There is room for considerable variety of institutional detail. Much will depend on existing institutions, organizational and administrative styles, and preferred methods of work in each country concerned. Yet there are some promising prototypes from which useful ideas may be gathered, and a few of these will be described later in this chapter. Also, some useful organizational principles can be put forward, based on experience of the more successful prototypes and on analysis of the problems with which an OTO must deal. These principles should be given serious consideration in any newly developing country -- or, for that matter, any highly developed country -- planning to establish or improve an occupational education and training system.

Probably the most generally recommendable structure for an OTO, if in line with a country's institutional and legal habits, is some form of autonomous, quasi-public entity with a governing body representing:

1. Employers, public and private

2. Workers, through representatives of trade unions and professional associations

3. Government agencies concerned, usually the labor and education ministries, but also perhaps other ministries or agencies concerned with manpower, planning, economic affairs, industry, commerce, or agriculture

4. Special education and training institutions or development services actively engaged in work related to the OTO's functions.

It may be desirable for the OTO to have a substructure consisting of regional boards and/or boards for particular activities (different industries, agriculture, commerce, transport services, health services, etc.). This will depend on the size of the country and on the complexity of its economic, social, and political structure. In countries having relatively decentralized federal systems the operational OTO might be a set of provincial or regional or state organizations, as in Brazil, where the national organization (SENAI) performs mainly over-all planning and service functions. In countries where industry is rather highly developed and diversified and where there are strong management and labor organizations within industrial sectors, it may be appropriate to constitute a number of fairly independent industry training boards (construction, textiles, metallurgy, etc.), as in the United Kingdom. Where the amount of industry is less and where traditions of intra-industry organization are less well established, an elaborate system of separate industry boards might be inappropriate. This was the conclusion reached by a Nigerian working group, after first considering a proposal modelled on the United Kingdom's plan. Several OTO's in Latin America, such as Venezuela's INCE and Colombia's SENA, include within the scope of one administrative organization, with subdivisions, training programs for many kinds of industry and also for commerce, agriculture, and even additional special programs such as INCE's for unemployed youths.

In some countries the OTO might be established as an autonomous public or quasi-public agency, in others as a dependency of one of the national ministries or as an adjunct of a national manpower board. The point of capital importance is that it be established in such a way as to encourage effective linkage (communication, joint planning where appropriate, cooperation on implementation of plans) among the agencies and institutions concerned with general and occupational education, occupational training, and employment.

In all cases the OTO will need a strong staff headed by a full-time administrator of high competence. The administrator must have the prestige which inspires confidence and cooperation in the worlds of industry and commerce, labor, government, and education.

Functions and Methods of Work

The central purpose of the OTO should be the improvement and expansion of occupational education and training, with a special but not exclusive emphasis on in-employment training and related further education. Stemming from this central purpose will be a number of subsidiary purposes and functions, the most important of which is this: The OTO should serve as a coordinating mechanism to promote communication and cooperation linking occupational training programs of the employment system to the general and pre-occupational education programs of the school system, to the work of special professional, technical, and vocational schools, and to the work of educative development services such as agricultural extension and industrial productivity centers.

The OTO should follow the policy of persuading and subsidizing other organizations -- employers, schools, training centers, etc. -- to undertake a large share of the actual training work. It should also cooperate closely with productivity centers, small industry service institutes, management associations, labor unions, and other agencies that are able to run good training programs. Where necessary, it should subsidize their training programs, besides assisting in the training of instructors, preparation of materials, and in other concrete ways.

Only where others cannot do the job that needs to be done, even with help from the OTO, should the OTO itself directly undertake a training task. In practice, it may have to do a substantial amount of such work in a newly developing country, because facilities and staffs are otherwise not available. For this reason, and also to discharge some of its other functions, the OTO may need to establish special training centers of its own. Nevertheless, the general policy should be to hold this within reasonable limits in order to encourage a more decentralized and pluralistic approach and especially to make maximum use of facilities (equipment and personnel) of employing establishments.

In order to accomplish its main purpose, the OTO will need to perform a variety of related functions. For example, it is likely to find it necessary to:

1. Train training officers and instructors and help employing establishments to install training units.
2. Prepare training materials, experiment with, develop, and test new materials and methods.
3. Subsidize training programs.
4. Set standards for aided training programs and provide expert advice to assist those in charge of such programs to attain or surpass the standards.
5. Prepare and administer examinations for testing levels of proficiency attained in specified types of occupational education and training.
6. Encourage mechanisms such as joint advisory committees at all levels, local to national, to build up communication and cooperation among all concerned with occupational education and training.
7. Undertake, or get others to undertake, studies on present and probable future demand for and supply of various kinds of qualified personnel; use this information to (a) adjust training programs, (b) advise trainees, and (c) provide school vocational guidance counsellors with a better basis for their work.
8. Undertake, or get others to undertake, research on the working of the human resource development system of the country and on ways to improve it -- for example, on incentives and disincentives influencing occupational choices, neglected areas of occupational preparation, and new training technology.

Funds and Incentives

It is assumed that the costs of education -- general, pre-occupational, and further education -- will continue to be borne by the normal sources of educational finance in the country concerned, whatever these may be. In most cases educational funds derive from tax revenues at one or more levels of government.

The costs of training (as distinguished from education) should be borne mainly by the employment system. If this policy is implemented, the education system will be relieved of a costly training burden which it generally performs inadequately. The schools will thereby be in a better position to perform their central function -- that is, to produce educated and trainable people -- while relying on the employment system to carry most of the costs of highly specific training. Educational institutions could well cooperate in specific training, but on a cost-reimbursable basis.

For the sake of good social cost-accounting and correct signals through the market-price mechanism, there is a strong case for collecting the costs of specific training from the industry or other activity that directly benefits from it, approximately in proportion to the trained manpower that it uses. This can be done by the device of a training levy assessed as a small percentage of the payrolls of all employers included in the scheme. In several Latin American countries the levy is collected through the social security mechanism. Experience suggests that a levy of 1% or 2% on gross wages and salaries will provide adequate funds for at least a good start on a program of occupational training. For administrative reasons, it is probably desirable to exempt very small employers -- say those with less than ten employees -- at least at first.

In order to provide an incentive for training, grants or rebates can be given to employing organizations which establish and run adequate training programs of their own, as attested by OTO inspection based on agreed standards. In fact, a very important reason for recommending a compulsory training levy on employers is that the offer to rebate part or all of it provides a powerful lever with which to induce the employers to mount their own training programs. Such programs are likely to be both more realistic and less costly for equivalent results than training programs in a vocational school. Furthermore, the very fact that an employing organization is induced to establish and run a systematic training program will most probably improve the morale as well as the competence of its work force and raise the efficiency of its operations. Progressive employers realize this, and many of them, where the organization is large enough, already engage in training.

But in the absence of the kind of system recommended here, any employer who invests in a training program has to reckon with a more or less sizeable percentage of cases in which he gets little or no return on his investment in training, because some employees leave soon after training -- perhaps hired away by another employer who thus gets trained personnel without paying the costs of training. This "leakage" of the benefits of training substantially reduces the incentive for any given employer to undertake training, unless he is very large or without competitors in the skills he trains for. The proposed OTO system, by contrast, says to each employer, "If you cannot or do not wish to do your share of training, you must pay the training levy and thus contribute toward the costs of having training provided elsewhere. On the other hand, if you are able and willing to do a good job of training, the OTO will reimburse at least part and perhaps all of your training costs."

There are, of course, other conceivable ways of financing an OTO and the training programs which it should stimulate. One alternative is to appropriate public revenues from general tax sources. In countries at relatively early stages of economic development it may be essential or advisable to start the OTO and its programs by covering some of the costs from the government's general funds or those earmarked for development.

Another possibility is to impose a levy on employers, but on some other basis than a percentage of wages and salaries -- perhaps a percentage of capital, or of sales, or of income. In some respects, a payroll tax is not a good tax. It tends to increase the cost of labor in relation to capital and might, therefore, have an adverse effect on employment, encouraging employers to substitute machinery for labor to a higher degree than is justified by the relative opportunity costs of labor and capital in the country. But the effect of a 1% or 2% tax is hardly likely to be significant in this respect, and the manifest equity of a training levy based on a figure which reflects the amount of human resources being used, plus the ease of administration (as compared with, say, a tax on capital, income, or output), turns the balance in its favor. Furthermore, if the proceeds of the payroll levy are well used and training programs financed by it increase the average efficiency of labor by, say, 5% or more, this will more than offset the 1% or 2% levy and produce a net encouraging effect on employment of labor. In rebuttal to this, of course, it can be said that the net encouraging effect on employment might be still larger if the funds had been raised by a tax on income or in some other manner that does not increase even slightly the cost of hiring labor.

The payroll levy has an additional advantage in that it can be applied to governmental, quasi-public, and noncommercial organizations as well as to commercial organizations that have capitalization, sales, and earned income. Government agencies are often the largest employers of educated and trained personnel in newly developing countries.

Another way of financing training, particularly training connected with large development projects such as irrigation and power systems or steel mills, might be to provide that a designated percentage -- say 5 per cent of the outlays -- be earmarked for this purpose.

SOME INSTRUCTIVE PRECEDENTS

For examples of some of the practices recommended here, we shall note the structure, financing, and working methods of a number of organizations in Latin America devoted to occupational training. A brief account of Tunisian organization in this field follows. Then attention will be drawn to the United Kingdom's approach under its Industrial Training Act 1964. Several features of that Act and of steps taken for its implementation are very progressive and have suggestive value for other countries. Finally, some noteworthy proposals put forward in Nigeria by the Comparative Technical Education Seminar Abroad in 1966 will be summarized.

There have been valuable experiences and innovations in other countries that also deserve the attention of those concerned with the planning of systems of occupational education and training -- for example, in Japan, the U.S.S.R., France, Germany, Sweden, and the United States -- but this study cannot undertake a comprehensive survey.

In Latin America[1]

A distinctive group of organizations for occupational training has grown up in Latin America, the first founded in 1942 and the others since 1957. They have been assisted by the ILO and also in some cases by bilateral aid programs. These organizations include:

SENAI in Brazil (Serço Nacional de Aprendizagem Industrial -- National Service of Industrial Apprenticeship), dating from 1942. Later a similar organization in the field of commerce was established, SENAC.

SENA in Colombia (Servicio Nacional de Aprendizaje -- National Apprenticeship Service), 1957.

INCE in Venezuela (Instituto Nacional de Cooperación Educativa -- National Institute of Educational Cooperation), 1959.

INACAP in Chile (Instituto Nacional de Capacitación Profesional -- National Institute of Occupational Training), founded in 1959 as SCT (Servicio de Cooperación Técnica -- Technical Cooperation Service) and renamed in 1966.

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[1] Information based on reports and other documents of the organizations mentioned and on visits to several of them. See also United Nations, Economic and Social Council 1964, Add. 2, Annex B:124-128.

CONET in Argentina (Comisión Nacional de Educación Técnica -- National Commission for Technical Education), 1960.

SENATI in Peru (Servicio Nacional de Aprendizaje y Trabajo Industrial -- National Service of Apprenticeship and Industrial Work), 1961.

INA in Costa Rica (Instituto Nacional de Aprendizaje - National Apprenticeship Institute), 1964.

SECAP in Ecuador (Servicio Ecuatoriano de Capacitación Profesional -- Ecuadorean Training Service), 1966.

Organizational Structure and Financing

Nearly all these organizations are autonomous public corporations created by law and financed by a tax on the payrolls of employing organizations. (An exception is INACAP, a subsidiary of CORFO, the Chilean development corporation; it is financed by CORFO, which in turn gets its funds from the government.) The rate of the payroll tax is generally 1%, but in the case of SENA has been raised to 2%.

The pioneer of the group, SENAI, was founded on the initiative of Brazilian industrial employers and is managed by their national confederation. SENAC is managed by the corresponding confederation of commercial employers. The more recently created organizations have governing bodies representative of various economic and social interests and government departments. For example, the National Administrative Council of INCE consists of a president, vice president, and secretary-general appointed by the President of the Republic; representatives of the ministries of development, education, and labor; representatives of the chambers of agriculture, industry, and commerce; and representatives of farmers' organizations, industrial workers, and the Venezuelan Teachers' Federation. On SENA's National Council are the Minister of Labor or his representative, the Minister of Education or his representative, and representatives of the Roman Catholic Church, industrial employers, commercial employers, agriculturalists, and workers.

Each organization has a full-time administrative head who directs a substantial staff. In some countries there are geographical divisions or, as in the case of Brazil, suborganizations that have a considerable degree of autonomy in operations.

Scope and Nature of Activities

The earliest organization, SENAI, was established for industrial training only (supplemented later by SENAC for commercial training), but some of the more recent ones have a much broader mandate.

SENA is to provide "occupational training to workers, young and adult, in industry, commerce, agriculture, animal husbandry, and mining."

INCE lists as its specific aims:

1. To organize, develop, and promote occupational preparation of adult workers at all levels, by establishment of specialized courses and courses within enterprises, in cooperation with employers, and to collaborate in activities designed to increase productivity.

2. To organize, develop, and promote apprenticeship of young workers, in special schools or within the enterprises themselves in cooperation with employers.

3. To contribute to the agricultural training of rural school leavers, with the object of producing farmers capable of utilizing the land and other natural resources efficiently.

4. To collaborate in the battle against illiteracy and contribute to improvement of general primary education in the country, insofar as this advances occupational preparation.

5. To improve and prepare materials required for better occupational preparation of workers.

In fulfillment of these aims, INCE's activities include: determining national manpower requirements and those of specific industrial sectors; preparing manuals of instruction; organizing and promoting training within enterprises, by means of systematic apprenticeship for workers 14 to 18 years of age, training courses outside of working hours for specialization and advancement, instructor training, and training of foremen; and establishing training centers for those trades or occupations where a need is indicated by manpower surveys. INCE works not only with urban industry and commerce but also has an active rural program. While its regular program is directed mainly to workers already in service, the government has charged it with responsibility for a special program designed to give occupational training to 50,000 unemployed youths. This is supported by a special government grant.

SENATI in Peru has developed a noteworthy plan for aiding manufacturing firms to establish "Company Instruction Units." The firm is encouraged to designate a member of its staff as company training coordinator, and SENATI works with him in analyzing training needs, planning programs, and providing instructors or training company men to give instruction.

In Tunisia[2]

The regular education system in Tunisia includes what is called "middle education" (a post-primary occupationally oriented education of three years' duration) and six-year technical high schools. Experience showed that "middle education" was not entirely satisfactory for training skilled manpower. The education system lacked the necessary flexibility to adjust readily to changing manpower needs. The young graduates lacked "industrial rhythm," and employers refused to hire them at the wages of skilled workers. The graduates themselves had a false sense of their qualifications, which created expectations that led to conflict and disappointment. Also, the regular school system based on age-group homogeneity did not provide for continued education of adult workers, and it did not take advantage of the training potential that exists in factories which have good equipment and qualified personnel.

Hence, the government created a number of new institutions to correct and supplement the former system. These were originally established under the Department of Social Affairs but have lately been placed under a financially autonomous Agency for Occupational Training and Development, directed by an administrative board composed of representatives from labor and employer organizations and from the government departments of Education, National Economy and Planning, and Social Affairs. "The fact that the same institution will deal with both employment and training problems clearly shows the close relationship we intend to establish between these two activities, both of which tend toward the same final goal: economic development combined with human development."

The newly created institutions included: Centers for Accelerated Vocational Training, open to people who have a minimum level of instruction without age limit. Skill Improvement Centers, which aim to provide a specialization for the young graduates from the "middle education" system, particularly in such fields as auto mechanics, agricultural mechanics, shoemaking, and woodworking. These centers benefit from the collaboration of the employers in the branches of industry to which the program relates. On-the-Job Training, a program which consists of placing the graduates from "middle education" as trainees in factories for a period varying from three to six months. The employer pays nothing during this period and the government pays a subsistence scholarship. At the end of the period the trainee is definitely hired or rejected. "This system, although costly to the government, has shown good results." Upgrading Courses, given at night and offered at different levels. These may possibly lead to the rank of engineer. An Apprenticeship System, in order to utilize the factories' potential for occupational training. Educators have been especially trained to supervise the working of the apprenticeship contracts, and supplementary courses are given to apprentices to broaden their general education and their technical knowledge. Before entering into apprenticeship, the trainees spend a year in Pre-Occupational Training Centers where they learn to handle tools and acquire correct attitudes.

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[2] Information based on a paper "Tunisian Experience in the Adaptation of Technical Education and Occupational Training for the Needs of the Employment Market," by Mohamed Ennaceur, President and Director General, Agency for Occupational Training and Employment, Tunisia. This paper, prepared for the Workshop on Occupational Education and Training for Development held at Stanford University in July-August 1967, is available in Alexander-Frutschi 1968.

In 1956 the government established the occupational training tax, which is paid annually by each factory in an amount proportional to its payroll. The law provides for reimbursement to employers who conduct training. This reimbursement may cover part or all of the employer's training outlays. Depending on the extent of their training efforts, some factories can even be totally exempted from the tax.

A 1964 law created the National Council of Occupational Training and Employment and subordinate regional councils. The National Council is headed by the Secretary of State for Social Affairs, and the regional councils by the regional governors. The councils include representatives from employing organizations, labor organizations, and the education authorities. There are also sectoral commissions for the different types of economic activity and national examination boards for the various specializations.

The government and the Council try to sensitize employers to the need for training and to get them to take primary responsibility for meeting the need. For some cases, such as important factories or organized groups of employers, "Integrated Centers" have been established. These are training institutions managed by a mixed committee headed by the employer and sometimes located in the factory. The government gives subsidies to these centers, but the employer must also participate in its financing.

In the United Kingdom[3]

The United Kingdom's Industrial Training Act of 1964 introduced important innovations that are having a profound effect on education and training for industry in that country.

Industrial Training Boards and Central Training Council

The Act empowers the Minister of Labor to appoint industrial training boards, after consultation with organizations representing employers and employees. Among those now functioning are, for example, the Engineering Industry Training Board, the Iron and Steel Industry Training Board, the Textile Industry Training Board, and the Construction Industry Training Board. It is expected that there will ultimately be about thirty. Some of the boards are establishing joint committees to handle overlapping problems.

Each board consists of a paid chairman, an equal number of representatives of employers and employees, and other members appointed after consultation with the Secretary of State and the Minister of Education. Only the representatives of employers and employees may vote on imposition of a levy. Nationalized industries are treated as employers.

The Minister has also appointed a Central Training Council, as authorized by the Act. It consists of a chairman, six members each appointed in consultation with organizations of employers and of employees, two members appointed after consultation with nationalized industries, not more than six chairmen of Industrial Training Boards, and twelve other members, of whom six are appointed after consultation with the Secretary of State and the Minister of Education. The Council advises the Minister of Labor on the exercise of his functions under the Act. It has established a number of working committees and issued studies and policy memoranda on such topics as the training of training officers, industrial training and further education, training in safety, and the use of programmed instruction.

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[3] Information based on documents of the Ministry of Labor, the Department of Education and Science, and memoranda and information papers of the Central Training Council and various industry boards set up under the Industrial Training Act 1964, supplemented by interviews with persons involved in administration of the Act.

The Levy and Grant System

Each board assesses the training situation and training needs in its industry and takes steps to meet the needs more adequately. Funds for this purpose are raised by imposition of a levy on employers in the industry, the rate being determined by each board with the approval of the Minister of Labor. In the engineering industry, the amount of the first annual levy was 2 1/2% of total wages and salaries, which the Board said "was set to yield a sum roughly equal to the present cost of training in the industry." Other early levies were 0.75% of total wages and salaries in the wool industry, 0.55% in shipbuilding, 0.5% in construction (raised the second year to 1%), and £7 per employee in the iron and steel industry.

The Act authorizes the boards to operate a system of training grants designed to increase the amount and quality of training. The Engineering Industry Training Board notified its constituents that grants for training would consist of two parts: the general grant, which will be based on verified costs of each employer's training arrangements, and a series of supplementary grants for aspects of training to which the Board wishes to give special encouragement. "In due course the Board will publish standards and only firms reaching the standards will be awarded a full performance rating which will entitle them to maximum grant." The Board will take into account the quantity and character of the training being done in each of three broad categories: (1) training of managerial, technical, commercial, clerical and supervisory staff; (2) apprentice training or equivalent training for skilled crafts; and (3) operative training. The Board added:

> "The relationship between the performance ratings and the percentage of its levy payable to a firm in grant will be set so as to give the firm with a high performance rating a grant in excess of its levy; this is to reward the firm already doing good training with, in effect, a net payment toward the cost of that training. The firm doing too little training, or training of inadequate standards will, through the levy and grant system, be making a net payment to the Board. Taken together, therefore, the levy and general grant schemes will redistribute part of the existing training costs, and make a financial contribution toward the training costs of those firms who are prepared to improve both the size of their training programmes and their standard of training."

Ways of Working and Some Effects

There are indications that the training boards in combination with the levy-grant scheme are exerting a significant influence for wide dissemination throughout industry of better training practices. Furthermore, the new system seems to be producing a ferment of ideas and innovations. Again taking the Engineering Industry Training Board as an example, the Board has published a handbook on a recommended pattern of first-year training for craftsmen and technicians. It has also worked out a structure of further training after the basic first year built around a flexible system of "training modules" and "experience modules." These are designed to replace the rigidities of former systems of uniform syllabi and fixed lengths of training. The Board is encouraging group training achemes for smaller firms which cannot themselves provide a full range of training facilities; it offers grants to cover administrative costs and the cost of employing a group training officer during the development of a new group scheme. The Board will also provide and equip workshops for the first-year apprentice training of craftsmen and technicians; the workshops will be prefabricated and will each have a minimum of thirty places. They will be available for use by group schemes. The Board will pay grants to employers who send staff to training courses for training officers or instructors; approved courses are being offered at some twenty technical colleges and other institutions. The Board invites applications from any firm, organization, or educational body for grants to support research projects directed toward improving the effectiveness of training.

Another apparent effect of the new system is to promote closer, more continuous, and better organized cooperation between industry and educational institutions. All approved training programs must include associated further education. This seems likely to increase the demands on and the support for educational institutions offering appropriate courses on a "day release," "block release," or other part-time basis. There are educational members on all training boards, and the Central Training Council is encouraging close contacts at regional and local levels between those responsible for training programs and the education authorities. Grants are available to firms which provide practical training for students during the industrial part of "sandwich" courses (alternating between institutional and in-plant work). These grants apply whether the student is employed by the firm, by another firm, or is based at an educational institution and not actually in employment.

Finally, the system is working to persuade managements that, in the words of a Central Training Council memorandum, "sound and well-organized training is essential to the greater efficiency and profitability of an undertaking" and that the scope of training efforts should extend to all types of industrial occupations and to mature persons as well as youths.

In Nigeria: A Study and Recommendations[4]

In mid-1966 a notable report was submitted by eighteen of the most experienced Nigerian technical education officers, under the chairmanship of Dr. Adam Skapsi, Education Advisor to the Ford Foundation in Nigeria. These officers, designated by the education authorities of the then federal and regional governments, had inspected vocational and technical education systems in four countries as a "Comparative Technical Education Seminar Abroad" and then held numerous working sessions at home. The report contains important recommendations, of interest in other countries as well as in Nigeria, on general education and pre-vocational and pre-technical training and on the role of industry in vocational and technical training.

On the role of industry, the report noted that "there is no institutionalized relationship in Nigeria between industry and public corporations on the one hand, and the educational authorities on the other, that would insure industry's influence on (and participation in) vocational and technical training." To remedy this situation, the report recommends the creation of Industrial Training Boards, one for each group of broadly related industrial activities. Each Board, after it has been fully developed, would be composed of:

"(a) representatives of industry (including public corporations);

(b) a representative(s) from trade unions;

(c) a representative of the Committee on Pre-Vocational Education;

(d) a representative of the Consultative Committee of Principals of Trade Training Centres;

(e) a representative of the Consultative Committee of Principals of Technical Colleges;

(f) a representative of the Engineering Faculties of Nigerian universities;

(g) a representative from each: the Ministry of Labour, the Ministry of Works, and the Ministry of Trade;

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[4] Information based on the report referred to (Nigeria 1966) and on discussions with the Chairman and members of the Comparative Technical Education Seminar Abroad.

(h) a representative of the Bureau for Small Industrial Enterprises."

It was proposed that, in the initial stage, Industrial Training Boards be established in six fields: oil exploration, production and refining; textiles; mechanical engineering and manufacturing of metal products; agricultural products processing and food processing (rubber, vegetable oils, etc.); civil engineering and building; and electrical engineering and electronics.

An over-all "National Industrial Training Board" is proposed as a mechanism for the pooling of the findings of the Industrial Training Boards and for the coordination of their views with those of technical education administrators and examiners in order to develop a coherent training plan for the whole country. This National Industrial training Board should be composed of the chairmen and one member from each of the Industrial Training Boards, together with representatives of technical education and examination authorities, the Ministry of Labor, and the Society of Engineers.

It was further recommended that a payroll levy of the order of 1.2% be imposed by the government on all industrial firms (including public corporations) which employ more than a certain minimal number of workers to be agreed upon between industry and the government. The sums so collected would be paid into a central co-operative training fund to be established under the administration of the National Industrial Training Board. The government should also contribute yearly to this fund a reasonable sum as an outright grant. Industrial firms should be allowed to write off as total amortization that part of their capital investment which they channel specifically into industrial training.

Out of the central co-operative training fund, the National Industrial Training Board would pay:

"(i) Co-operative Training Grants to those industrial firms which provide practical experience for students of vocational and technical schools;

"(ii) Training Grants to those firms which operate adequate full (theoretical and practical) training schemes of their own;

"(iii) Extra Training Grants to those of the above firms which admit to their training schemes more trainees than they need for their own employment (i.e., non-sponsored students)."

The size of the grants would be determined by the National Industrial Training Board, which would set up criteria for eligibility and machinery for inspection.

The Report comments:

> "This scheme would transfer, at least partly, the cost of training to the firms which up till now have avoided making any investment in their own training systems.... We are making the above recommendations because we are hopeful that they would help shift the main burden of training for industrial purposes from the Government to industry in the long run. As for the Government, it should, in our opinion, gear the expansion of its own vocational and technical schools so as to provide craftsmen and technicians for those industries and corporations which cannot do their own training until the time at which the Co-operative Training arrangements will be able to meet these needs; and to provide manpower training for the Government's own agencies."

As a first step in the establishment of the proposed industrial training boards, the report recommended that the government should call a meeting of all those whose cooperation would be needed, in order to give the representatives of industry and other interested bodies an opportunity of expressing their views. Preliminary discussions based on an early draft of the report showed that industry representatives were apprehensive on a number of scores. Among other things, they pointed out that in Nigeria at its present stage of development there are relatively few firms with organized training programs and training officers. To set up multiple training boards might mean that the same few men would be meeting repeatedly, first on one board and then on another. It is probably practical considerations like these which lead the Chairman of the Seminar to add a footnote as follows:

> "It might perhaps be most practicable to start with the formation of the National Industrial Training Board in which a restricted number of industrial groups would be represented each by one delegate (prospective chairman of the respective Training Board). This National Training Board would then recommend in which industrial groups the Training Boards should be set up first and in which order. The Training Boards themselves would, in the formative stage, be mere skeletons of their future full structures and would be enlarged gradually in the light of the gained experience."

Appendix

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